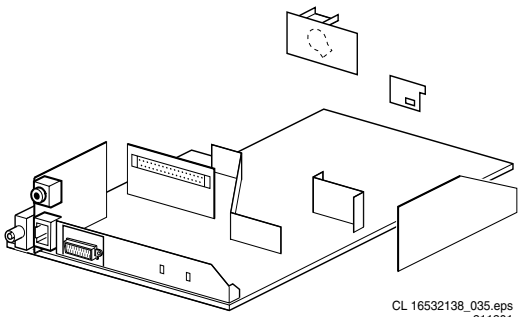
Colour Television

Chassis

L01H.2E

AA

Service
Service
Service



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ServiceManual

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PHILIPS

1. Technical Specifications, Connections and Chassis Overview

Note: Described specifications are valid for the *whole* product range.

1.1 Technical Specifications

1.1.1 Reception

Tuning system	:	PLL
Colour systems	:	PAL B/G, D/K, I
	:	SECAM B/G, L/L'
Sound systems	:	FM/AM mono
	:	FM stereo (2CS)
	:	NICAM
	:	FM radio (10.7 MHz)
A/V connections	:	PAL BG
	:	SECAM L/L'
	:	NTSC 3.58 (playback only)
	:	NTSC 4.43 (playback only)
Channel selections	:	100 channels
	:	UVSH
IF frequency	:	38.9 MHz
Aerial input	:	75 Ω, Coax

1.1.2 Miscellaneous

Audio output (RMS)	:	1 W mono
	:	2 W mono
	:	4 W mono
	:	2 x 3 W stereo
Mains voltage	:	220 - 240 V (± 10 %)
Mains frequency	:	50 / 60 Hz (± 5 %)
Ambient temperature	:	+ 5 to + 45 deg. C
Maximum humidity	:	90 %
Power consumption	:	36 W (14") to
	:	52 W (21")
Standby Power consumption	:	< 3 W

1.2 Connections

1.2.1 Front Connections and Front Control

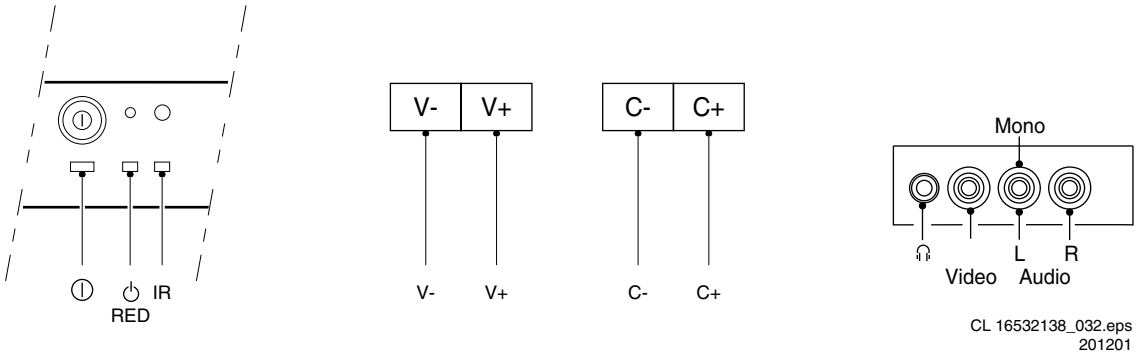


Figure 1-1

Audio / Video In

1	Headphone	3.5 mm (8 - 600 Ω / 4 mW)	
2	Video	CVBS (1 Vpp / 75 Ω)	
3	Audio	Mono (0.5 Vrms / 10 kΩ)	

1.2.2 Rear Connections

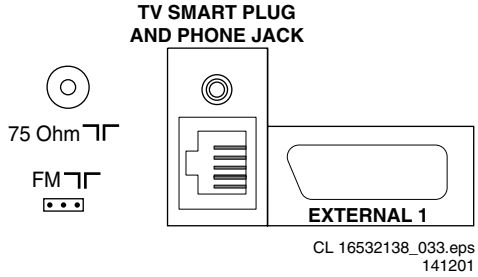


Figure 1-2

External 1: RGB/YUV in + CVBS in/out

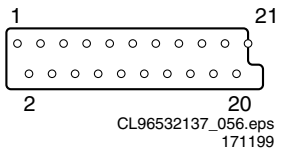


Figure 1-3

1	Audio	R (0.5 Vrms / 1 kΩ)	
2	Audio	R (0.5 Vrms / 10 kΩ)	
3	Audio	L (0.5 Vrms / 1 kΩ)	
4	-	GND	
5	-	GND	
6	Audio	L (0.5 Vrms / 10 kΩ)	
7	Blue / U	(0.7 Vpp / 75 Ω)	
8	CVBS-status	0 - 2.0 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	

9	-	GND	⏚
10	-		
11	Green / Y	(0.7 Vpp / 75 Ω)	⊖
12	-		
13	-	GND	⏚
14	-	GND	⏚
15	Red / V	(0.7 Vpp / 75 Ω)	⊖
16	RGB-status	0 - 0.4 V: INT 1 - 3 V: EXT / 75 Ω	
17	-	GND	⏚
18	-	GND	⏚
19	CVBS	(1 Vpp / 75 Ω)	⊖
20	CVBS	(1 Vpp / 75 Ω)	⊖
21	Earth	GND	⊥⊖

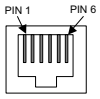
TV Aerial In

Aerial input : 75 Ω, coax (IEC-type)

FM Radio In

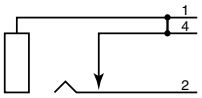
Aerial input : via 'coax-to-3 pins' adapter
: 'cable' or 'wire' antenna

TV SMART PLUG



RJ11 CONNECTOR	DESCRIPTION
1	CLOCK
2	DATA IN
3	+5V
4	DATA OUT
5	GND
6	IR DATA

PHONE JACK FOR BATHROOM SPEAKER



1, 4 SPEAKER +
2 SPEAKER -

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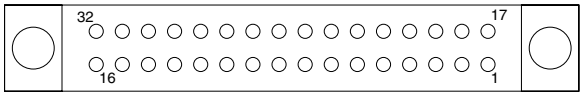
Figure 1-4

32 PIN SMART CARD CONNECTOR



PIN		PIN	
1	RESERVE	17	ANALOG BLUE IN
2	GROUND (POWER)	18	ANALOG GREEN IN
3	+12V	19	ANALOG RED IN
4	GROUND (IIC)	20	FAST BLANKING IN
5	IR-DATA	21	GROUND CVBS-OUT
6	POR	22	CVBS-OUT
7	TV-CLOCK	23	AUDIO OUT MONO +
8	DATA-IN	24	RESERVE
9	DATA-OUT	25	AUDIO OUT MONO −
10	+5V	26	GROUND AUDIO IN
11	HORIZONTAL SYNC OUT	27	RIGHT AUDIO OUT
12	VERTICAL SYNC OUT	28	LEFT AUDIO OUT
13	GROUND CVBS-IN	29	RIGHT AUDIO IN
14	SCL	30	LEFT AUDIO/MONO IN
15	SDA	31	CVBS/Y IN
16	RESERVE	32	"C" IN

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Figure 1-5

1.3 Chassis Overview

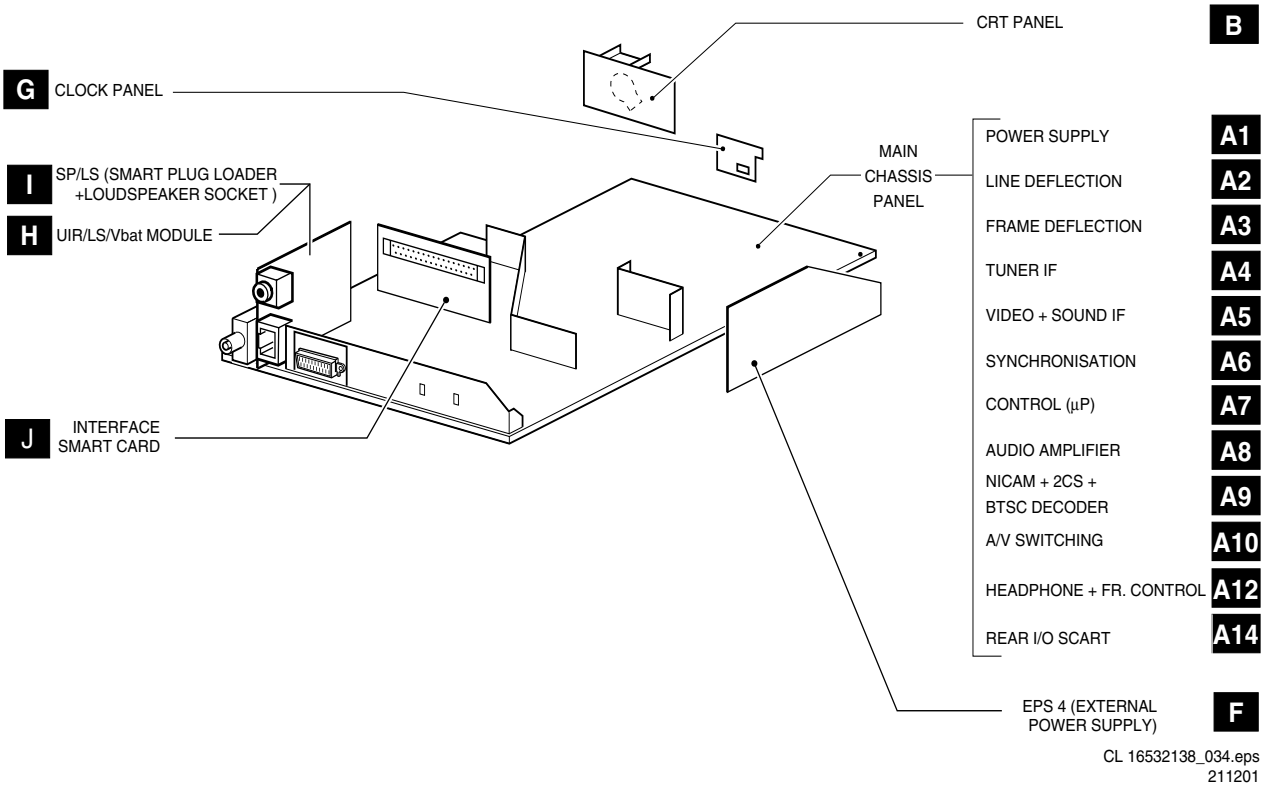

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Figure 1-6

2. Safety & Maintenance Instructions, Warnings, and Notes

2.1 Safety Instructions For Repairs

Safety regulations require that during a repair:
- Due to the 'hot' parts of this chassis, the set must be connected to the AC power via an isolation transformer.
- Safety components, indicated by the symbol ▲, should be replaced by components identical to the original ones.
- When replacing the CRT, safety goggles must be worn.

Safety regulations require that after a repair, the set must be returned in its original condition. Pay particular attention to the following points:
- General repair instruction: as a strict precaution, we advise you to re-solder the solder connections through which the horizontal deflection current is flowing, in particular:
  - all pins of the line output transformer (LOT)
  - fly-back capacitor(s)
  - S-correction capacitor(s)
  - line output transistor
  - pins of the connector with wires to the deflection coil
  - other components through which the deflection current flows.

Note: This re-soldering is advised to prevent bad connections due to metal fatigue in solder connections and is therefore only necessary for television sets more than two years old.
- Route the wire trees and EHT cable correctly and secure them with the mounted cable clamps.
- Check the insulation of the AC power cord for external damage.
- Check the strain relief of the AC power cord for proper function, to prevent the cord from touching the CRT, hot components, or heat sinks.
- Check the electrical DC resistance between the AC plug and the secondary side (only for sets that have an isolated power supply). Do this as follows:
  1. Unplug the AC power cord and connect a wire between the two pins of the AC plug.
  2. Turn on the main power switch (keep the AC power cord unplugged!).
  3. Measure the resistance value between the pins of the AC plug and the metal shielding of the tuner or the aerial connection of the set. The reading should be between 4.5 MΩ and 12 MΩ.
  4. Switch the TV OFF and remove the wire between the two pins of the AC plug.
- Check the cabinet for defects, to prevent the possibility of the customer touching any internal parts.

2.2 Maintenance Instructions

It is recommended to have a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:
- When the set is used under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When the set is used in an environment with higher dust, grease or moisture levels, for example in a kitchen, the recommended interval is one year.
- The maintenance inspection includes the following actions:
  1. Perform the 'general repair instruction' noted above.
  2. Clean the power supply and deflection circuitry on the chassis.
  3. Clean the picture tube panel and the neck of the picture tube.

2.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in Fig. 2-1, to discharge the picture tube. Use a high voltage probe and a multi-meter (position VDC). Discharge until the meter reading is 0 V (after approx. 30 s).

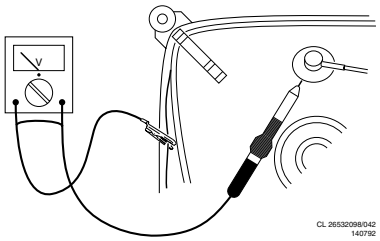

Figure 2-1

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this potential. Available ESD protection equipment:
  - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable, and ground cable) 4822 310 10671.
  - Wristband tester 4822 344 13999.
- Together with the deflection unit and any multi-pole unit, flat square picture tubes form an integrated unit. The deflection and the multi-pole units are set optimally at the factory. Adjustment of this unit during repair is therefore not recommended.
- Be careful during measurements in the high voltage section and on the picture tube.
- Never replace modules or other components while the unit is switched ON.
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.4 Notes

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the area of circuitry being tested.
- The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a color bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz (PAL) or 61.25 MHz (NTSC, channel 3).
- Where necessary, measure the waveforms and voltages with (⊓) and without (⊓) aerial signal. Measure the voltages in the power supply section both in normal operation (⏻) and in standby (⏻). These values are indicated by means of the appropriate symbols.
- The picture tube panel has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.
- The semiconductors indicated in the circuit diagram and in the parts lists are completely interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

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PHILIPS Institutional TV - Instructions for use

Installing the television

Safety

- Place your television on a stable and strong base.
- Leave at least a minimum free space of 5 cm on both sides and 10 cm from the top for sufficient ventilation of the set.
- Do not cover the ventilation openings with items such as newspapers, cloths, curtains, etc.
- Do not place any flame sources such as lighted candles on the television.
- Never try repairing the set by yourself; always contact a qualified technician.
- Do not expose the television to moisture or splashing and do not place any object filled with liquids on top of the television.

Environmental

Your television contains material that can be recycled and reused by specialised companies.
Please find out about local regulations on the disposal of your old television set.
Pay particular attention to the disposal of exhausted batteries.
Your television consumes energy in the stand-by mode.
Energy consumption contributes to air and water pollution.
We advise you to switch off your television overnight instead of leaving it in stand-by mode.

Connecting the mains

Insert the mains plug into the wall socket and switch on. Please refer to the label on the back of the television for the correct operating voltage.

Installing the remote control

- Remove the cover at the back of the remote control.
- Insert the correct type and size batteries into the compartment making sure they are the right way around.
- You can secure your batteries by fastening an appropriate screw into the hole of the battery cover.

Note
Clock and wake-up alarm are not available on Pro-Plus sets when television is switched off by mains switch.

Accessing the Set-up Menu

When the set is in the High Security Mode, the Set-up menu can be accessed only by a T374AH Institutional Set-up Remote Control (RG4172BK).
When the set is in the Standard Security Mode the Set-up Menu may be accessed with a guest remote control (like the RC2882) by a sequence of commands (3 1 9 7 5 3 MUTE).

Navigation

The current menu item can be selected by means of the cursor up and cursor down keys.
Submenus can be accessed from menu items with a "▸" symbol pressing the cursor right key.

- **Language**
  The Language function is shown in the Menu as "LANGUAGE", and its valid modes are "ENGLISH", "DEUTSCH", "FRANCAIS" and "ITALIANO".

- **No. of Programs**
  This sub menu allows setting the number of television, PAY-TV Radio and Info programs.
  The overall maximum number of programs is 125.

- **Installation**
  When this menu is open, all the protections are inactive. To exit any menu press Menu button.

Input
The "Input" menu item selects the desired input source that will be assigned to the program. Possible values are Front End, AV1, AV2 and AV2YC (internal interface for system televisions only), and RADIO.

System
WEST EU (PAL/SECAM-BG) and EAST EU (PAL/SECAM-DK), UK (PAL-I), FRANCE (SECAM-L/L').

Manual Search
Digits can be entered for a frequency in MHz. Right cursor starts an auto search; during frequency entry the digits not yet entered are displayed as dashes "-".
Enter "0" for frequencies below 100 MHz.

Program no.
The programme type can be selected with the cursor left/right buttons. These buttons will toggle between all available types: "TV", "INFO", "PAY-TV" and "RADIO".
If the program number of a certain type is 0, the corresponding type is not displayed.
In order to display a program number of the above-mentioned types, always enter two numbers, for example: "01" for TV1 or digit "1" and up/down cursor.

Store
The present program information is stored after pressing the cursor left/right button. Press Menu to exit without storing.

Fine Tune
Using the "control left/right" commands starts fine-tuning.

Protection
This function indicates whether the selected program has a protection or not. With the cursor left/right keys the protection can toggle between "YES" and "NO".

Label
This menu item will be used to add a label/name for each program. Pressing the left/right buttons you may enter or exit the label field; pressing the up/down cursor you may insert alphanumeric characters.
Pressing M (Menu button) you may exit the Label Menu item.

Teletext Language
This menu enables the user to select the Teletext character set to be used for the selected channel. With cursor left/right you can select a letter corresponding to the different language clusters.
"W": Pan European (Latin) / West option
"E": Pan European (Latin) / East option
"G": Greek
"A": Arabic
"C": Cyrillic

Video Blank
This item can change between "YES" and "NO" to activate or deactivate picture mute.

Audio Mute
This item can change between "YES" and "NO" to activate or deactivate sound mute.

Remarks
TELEVISION up/down, INFO up/down, PAY-TV up/down and RADIO up/down are active in menu mode and the television reacts the same way as in TV mode.

- **Clock set-up**
  The Clock set-up menu can be entered from this menu item
  The Menu items actually displayed depend on whether a LED clock display is available or not.

Display (OSD only)
Defines whether the actual time is displayed on the screen or not.

Display Standby (LED only)
This menu item will be used to set the intensity of the clock display when the television is in standby mode.

Display On (LED only)
This menu item will be used to set the intensity of the clock when the television is in the ON mode.

Time Setting
This menu item will be used to set the time for the clock.

Teletext Time Download
This menu item is used to activate or deactivate the function for automatic time downloading by means of Teletext.

Download Program
This menu item is used to select the channel from which to retrieve the correct time from the Teletext. When this item is selected the television set tunes to the selected program.

Time Offset
This menu item is used to set the offset needed to adjust the time received from the Teletext channel to represent the current time in the current location.

- **Brightness**
  The brightness control contains 63 discrete values from the minimum to maximum setting.
- **Colour**
  The colour control contains 63 discrete values from the minimum to maximum setting.
- **Contrast**
  The contrast control contains 63 discrete values from the minimum to maximum setting.
- **Sharpness**
  The sharpness control contains 63 discrete values from the minimum to maximum setting.
- **Forced mono (for stereo televisions only)**
  This command is used to activate or deactivate the stereo feature in stereo sets. Toggle YES, NO using the right/left cursor.
- **Balance (for stereo televisions only)**
  To balance the output sound from TELEVISION's speakers left and right
- **Treble (for stereo televisions only)**
  To set the treble frequencies of sound output from TELEVISION's speakers.
- **Bass (for stereo televisions only)**
  To set the bass frequencies of sound output from television's speakers.
- **AVL (Automatic Volume Leveller)**
  The Automatic Volume Leveller feature is shown as "AVL" in the menu and its valid states are "YES"; "NO".
- **Volume Fixed**
  The valid toggle states are "YES" and "NO": if YES, the volume is fixed at a certain volume, if NO, the volume contains 63 discrete values.
- **Volume Bar**
  To display volume bar when adjusting volume, select "YES". Select "NO" to hide the bar.
- **Min Volume**
  This item sets the limit for minimum volume allowed for the television set. Use right/left cursor to adjust.
- **Max Volume**
  This item sets the limit for the maximum volume allowed for the television set. Use right/left cursor to adjust.
- **Switch on Volume**
  This item sets the television's volume at switch on. Use the right/left cursor to adjust.
- **Buzzer Volume**
  This item sets the volume of the alarm buzzer. Use the right/left cursor to adjust.
- **Switch On Program**
  This item sets the television's program at switch on
- **Power On**
  The Power On menu function defines the behaviour of the television whenever AC Power is applied.
  The valid states are "FORCED", "STANDARD" and "STANDBY".
  When "FORCED", the television can only be switched OFF by means of the main switch or a set-up remote control or by ESP function (Energy Saving Programmability controls the maximum continuous viewing time allowed by the control system).
  When "STANDARD", the television switches on the previous status, ON or Stand-by.
  When "STAND-BY", the television always switches on in Stand-by.
- **Step Tuning (YES/NO)**
  If YES, TV programs (1 to 9) are tuned immediately when a digit is pressed.
  If NO, tuning is performed only after the dash disappears.
- **Digit Time-out**
  This is the time-out to enter the second digit for TV program 10 onwards.
- **Program Display**
  Program Display values can be: Number, Label, All, None.
- **Keyboard Lock**
  In Commercial Mode, the Keyboard Lockout menu function disables the television's local keyboard for volume and program control.
- **Free protected programs**
  With this item all protected programs can be freed. If "free protected programs" is set to "YES", all programs are accessible for the user, if the item is "NO" protected programs are skipped. A TV program can be selected by relevant digit but with picture blanked and sound muted.
- **ESP**
  Energy Saving Programmability Mode (ESP) controls the maximum continuous viewing time allowed by the control system.
  It allows the establishment to limit the time the Television remains activated once a Guest has checked-out.
  The ESP Menu function is shown as "ESP", and its valid values are 00 - 99 (in hours). 00 value means OFF.
- **Interface**
  This item is only present in "system" sets and it is used to enable or disable communication with the DCM (Data Communication Module).
- **Audio / Video Mute**
  The Audio/Video Mute menu function determines whether the video should be blanked and the audio should be muted if the currently tuned channel has no signal (Blue, Black, Off).
- **Auto Scart**
  Enable/ disable automatic switching to external Scart source.
- **Welcome Message**
  Press cursor left/right to display Welcome message entry menu:
  Welcome Message, Line 1, and Line 2.
  With the cursor up/down you can set the message characters.
- **Program Guide**
  This feature will enable/disable in a "list" or "page", the program numbers with the associated labels.
- **Reminder**
  This menu function is shown as "REMINDER", and its states are "YES": "NO".
- **Security**
  The menu function "SECURITY" allows the user to select one of two states "HIGH" or "STANDARD". The default is "STANDARD".
  While the set is in the Security High Mode the set-up menu can only be accessed by a T374AH Institutional Set-up Remote Control
  While the set is in the Security Standard Mode the Set-up Menu may be accessed with a guest remote control by a sequence of commands (3 1 9 7 5 3 MUTE).

4. Mechanical Instructions

Note: Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Rear Cover Removal

1. Remove all (seven) fixation screws of the rear cover: two at the top, two at each side and one near the mains cord holder.
2. Now pull the rear cover backward to remove it.

4.2 Service Position Main Panel

1. Disconnect the strain relief of the Mains cord.
2. Remove the main panel, by pushing the two centre clips outward [1]. At the same time, pull the panel away from the CRT [2].
3. Disconnect the degaussing coil by removing the cable from (red) connector 0201.
4. Move the panel somewhat to the left and flip it 90 degrees [3], with the components towards the CRT.

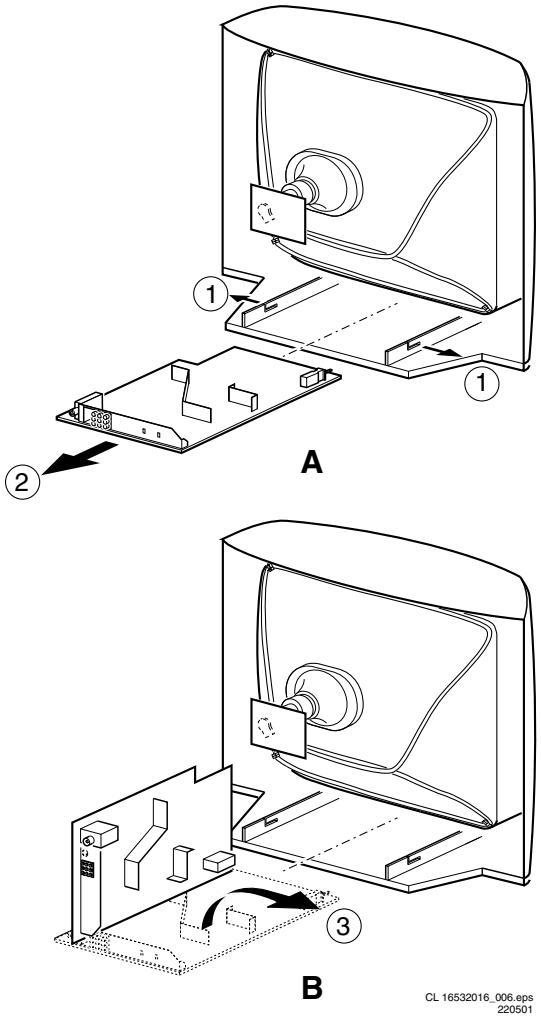

Figure 4-1

4.3 Rear Cover Mounting

Before you mount the rear cover:

1. Place the mains cord correctly in its guiding brackets (strain relief).
2. Place all cables in their original position.

5. Service Modes, Error Codes and Fault Finding

Index:

5.1 Test Points

The chassis is equipped with test points printed on the circuit board assemblies. These test points refer to the functional blocks:

Table 5-1

TEST POINT OVERVIEW L01		
Test point	**Circuit**	**Diagram**
A1-A2-A3-..	Audio processing	A8, A9 / A11
C1-C2-C3-..	Control	A7
F1-F2-F3-..	Frame drive and output	A3
I1-I2-I3-..	Tuner & IF	A4
L1-L2-L3-.	Line drive	A2
P1-P2-P3-..	Power supply	A1
S1-S2-S3-..	Synchronisation	A6
V1-V2-V3-..	Video processing	A5, B1

The numbering is in a logical sequence for diagnostics. Always start diagnosing within a functional block in the sequence of the relevant test points for that block.

Perform measurements under the following conditions:
- Service Default Alignment Mode.
- Video: colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

Service Default Alignment Mode (SDAM) offers several features for the service technician, while the Customer Service Mode (CSM) is used for communication between dealer and customer.

Table 5-2

SW Cluster	Software name	UOC type	Diversity
1EU1	L01HE1 X.Y	TDA9552	L01H.2E
Abbreviations: H = Hotel, E = Europe, 1 = Basic, Basic Plus and System, English, French, German and Italian			

5.2.1 Service Default Alignment Mode (SDAM)

Purpose
- To change option settings.
- To create a predefined setting to get the same measurement results as given in the manual.
- To display / clear the error code buffer when leaving SDAM with "STANDBY" key on remote control.
- To override SW protections.
- To perform alignments.
- To start the blinking LED procedure.

Specifications
- Tuning frequency:
  - 475.25 MHz for PAL/SECAM (Europe and AP-PAL)
- Colour system:
  - PAL-M for LATAM BI/TRI/FOUR-NORMA.
  - SECAM L for France.
  - NTSC for NAFTA and AP-NTSC.
  - PAL-BG for Europe and AP-PAL.
- All picture settings at 50 % (brightness, colour contrast, hue).
- Bass, treble and balance at 50 %; volume at 25 %.
- All service-unfriendly modes (if present) are disabled, like:
  - (sleep) timer,
  - child/parental lock,
  - blue mute,
  - hotel/hospitality mode
  - auto switch-off (when no 'IDENT' video signal is received for 15 minutes),
  - skip / blank of non-favorite presets / channels,
  - auto store of personal presets,
  - auto user menu time-out.
- Operation hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.

How to Activate SDAM

Use one of the following methods:
- Use a System 7 remote control type T374AH (RC-transmitter RG4172BK) and key in the code '062596' directly followed by the 'M' (menu) button or
- Short circuit jumper wires 9631 and 9641 on the mono carrier (see fig. 8-1) and apply AC power. Then press the power button (remove the short circuit after start-up). **Caution**: Entering SDAM by short circuiting wires 9631 and 9641 will override the +8V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could lead to damaging the set.

After activating SDAM, the following screen is visible, with S at the upper right side for recognition.

SDAM Menu

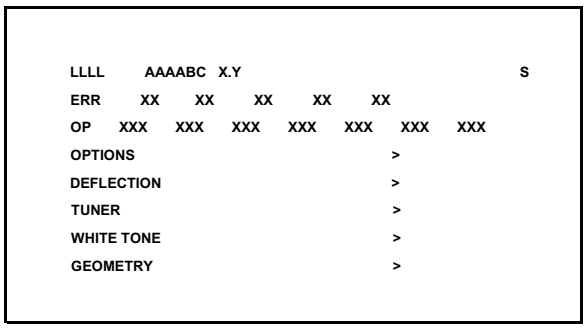

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Figure 5-1

1. **LLLL**
   This is the operation hours counter. It counts the normal operation hours, not the standby hours.
2. **AAAABC-X.Y**
   This is the software identification of the main micro controller:
   - A = the project name (L01H).
   - B = the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
   - C = the feature and language:

  - (Europe: 1 = Basic, Basic Plus and System, English, French, German and Italian)
  - (AP: 1 = Z, R and Y System, English, Malay and Simplified Chinese)
  - (Latam: 1=H and S system)
- X = the main software version number.
- Y = the sub software version number.

3. **S Indication of the actual mode.**
   S= SDAM= Service Default Alignment mode.
4. **Error buffer**
   Five errors possible.
5. **Option bytes**
   Seven codes possible.
6. **Options**
   To set the Option Bytes. See chapter 8.3.1 for a detailed description.
7. **Deflection**
   To set the deflection values. See chapter 8.3.2 for a detailed description.
8. **Tuner**
   To align the Tuner. See chapter 8.3.3 for a detailed description.
9. **White Tone**
   To align the White Tone. See chapter 8.3.4 for a detailed description.
10. **Geometry**
    To align the Geometry. See chapter 8.3.5 for a detailed description.

How to Navigate
Use one of the following methods:
- In SDAM, select menu items with the CURSOR UP/DOWN key on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the CURSOR UP/DOWN key to display the next / previous menu items.
- With the CURSOR LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected submenu.
- When you press the MENU key in a submenu, you will return to the previous menu.

How to Store Settings
To store settings first go back to the main menu (fig. 5-1) with "MENU" button on the remote control and then leave the SDAM with the "STANDBY" button on the remote control.

How to Exit
Switch the set to STANDBY by pressing the power button on the remote control transmitter. The error buffer is cleared. (If you switch the set 'off' by removing the AC power, the set will return in SDAM when AC power is re-applied and the error buffer will not be cleared.)

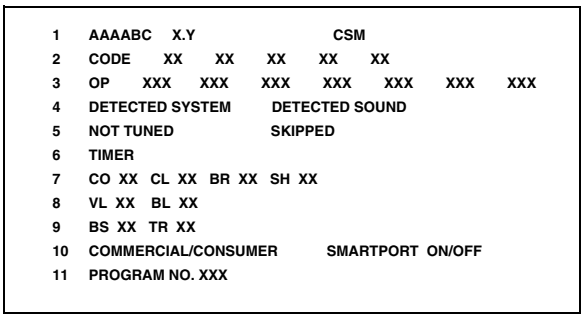
5.2.2 Customer Service Mode (CSM)

Purpose
When a customer is having problems with his TV-set, he can call his dealer. The service technician can then ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge how severe the complaint is. In a lot of cases he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer.
The CSM is a read only mode, therefore modifications in this mode are not possible.

How to Activate
To activate the CSM press the RECALL button on the System 7 remote control RG4172BK.

After switching ON the Customer Service Mode, the following screen will appear:

CSM Menu



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141201

Figure 5-2

1. Software identification of the main micro controller (see paragraph 5.2.1 for an explanation).
2. Error code buffer (see paragraph 5.4 for more details). Displays the last five errors of the error code buffer.
3. In this line, the Option Bytes (OB) are visible. Each Option Byte is displayed as a decimal number between 0 and 255. The set may not work correctly when an incorrect option code is set. See chapter 8.3.1 for more information on the option settings.
4. Indicates which color and sound system is installed for the selected pre-set.
5. Indicates if the set is receiving an 'IDENT' signal on the selected source. It will display 'NOT TUNED' if not.
6. Shows “TIMER” if the sleep timer is activated, shows nothing when sleep timer is not activated.
7. Value indicates parameter levels at CSM entry. CO= CONTRAST, CL= COLOR, BR= BRIGHTNESS, SH= SHARPNESS
8. Value indicates parameter levels at CSM entry. VL= VOLUME LEVEL, BL= BALANCE LEVEL
9. Value indicates parameter levels at CSM entry (only for stereo sets). BS= BASS, TR= TREBLE
10. Mode Commercial = Hotel / Institutional mode or mode Consumer. Smartport. Indicates whether the Smart Port is selected or not.
11. Program NO. TV. Indicates to what channel the TV is tuned.

How to Exit
Use one of the following methods:
- Press any button of the remote control transmitter.
- Press RECALL on a System 7 remote control (the RC-transmitter RG4172BK).
- Switch-off the TV set with the AC power switch.

5.3 Problems and Solving Tips (Related to CSM)

5.3.1 Picture Problems

Note: Below described problems are all related to the TV settings. The procedures to change the value (or status) of the different settings are described.

No Colours / Noise in Picture
Check CSM line 4. Wrong colour system installed. To change the setting:
1. Press the MENU button on the remote control.
2. Select the INSTALLATION sub menu.
3. Select and change the SYSTEM setting until picture and sound are correct.
4. Select the STORE menu item.

Colours Not Correct / Unstable Picture
Check CSM line 4. Wrong colour system installed. To change the setting:
1. Press the MENU button on the remote control.

2. Select the INSTALLATION sub menu.
3. Select and change the SYSTEM setting until picture and sound are correct.
4. Select the STORE menu item.

Picture too Dark or too Bright
Increase / decrease the BRIGHTNESS and / or the CONTRAST value when:
- The picture improves after you have pressed the 'Smart Picture' button on the remote control.
- The picture improves after you have switched on the Customer Service Mode

The new 'Personal' preference value is automatically stored.

White Line Around Picture Elements and Text
Decrease the SHARPNESS value when:
- The picture improves after you have pressed the 'Smart Picture' button on the remote control.

The new 'Personal' preference value is automatically stored.

Snowy Picture
Check CSM line 5. If this line indicates 'Not Tuned', check the following:
- No or bad antenna signal. Connect a proper antenna signal.
- Antenna not connected. Connect the antenna.
- No channel / pre-set is stored at this program number. Go to the INSTALL menu and store a proper channel at this program number.
- The tuner is faulty (in this case the CODES line will contain error number 10). Check the tuner and replace / repair if necessary.

Snowy Picture and/or Unstable Picture
- A scrambled or decoded signal is received.

Black and White Picture
Increase the COLOR value when:
- The picture improves after you have pressed the 'Smart Picture' button on the remote control.

The new 'Personal' preference value is automatically stored.

Menu Text Not Sharp Enough
Decrease the CONTRAST value when:
- The picture improves after you have pressed the 'Smart Picture' button on the remote control.

The new 'Personal' preference value is automatically stored.

5.3.2 Sound Problems

No Sound or Sound too Loud (After Channel Change / Switching On)
Increase / decrease the VOLUME level when the volume is OK after you switched on the CSM. The new 'Personal' preference value is automatically stored.

5.4 Error Buffer

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is written at the left side and all other errors shift one position to the right.

5.4.1 How to Read the Error Buffer

Use one of the following methods:
- On screen via the SDAM (only if the TV gives a picture). Examples:
  - ERROR: 0 0 0 0 0 : No errors detected
  - ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
  - ERROR: 9 6 0 0 0 : Error code 6 was first detected and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See next paragraph.

5.4.2 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:
- When you exit SDAM with the STANDBY command on the remote control (when leaving SDAM, by disconnecting the set from AC power, the error buffer is not cleared).
- If the content of the error buffer has not changed for 50 hours, it resets the buffer automatically.

Error Codes
In case of non-intermittent faults, clear the error buffer before you begin the repair. This to ensure that old error codes are no longer present.
If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).

Table 5-3

ERROR CODE TABLE				
ERROR	**Device**	**Error description**	**Def. item**	**Diagram**
0	Not applicable	No Error		
1	Not applicable	X-Ray Protection (USA)	2465, 7460	A2
2	Not applicable	Horizontal Protection	7460, 7461, 7462, 7463, 6467	A2
3	TDA8359/TDA9302	Vertical Protection	7861, VloAux +13v	A2, A3
4	MSP34X5/TDA9853	MAP I2C identification error	7831, 7861	A9 or A11
5	TDA95XX	POR 3.3V / 8V Protection	7200, 7560, 7480	A1, A2. A5, A6, A7
6	I2C bus	General I2C bus error	7200, 3624, 3625	A7
7	Not applicable	-	-	-
8	Not applicable	E/W Protection (Large Screen)	7400, 3405, 3406, 3400	A2
9	M24C08	NVM I2C identification error	7602, 3611, 3603, 3604	A7
10	Tuner	Tuner I2C identification error	1000, 7482	A2, A4
11	TDA6107/8	Black current loop protection	7330, RGB amps, CRT	B1, B2
12	M65669	MAP I2C identification error (USA)	7803	P

Note: Error 7 is Not applicable, Due to ASD issue.

5.5 The Blinking LED Procedure

Via this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful when there is no picture.
Go into the SDAM menu with one of the following methods:
1. '062596 M' on a System 7 remote control (the RC-transmitter RG4172BK).
2. Short circuit wires 9631 and 9641 on the mono carrier and apply AC power. Then press the power button (remove the short circuit after start-up).

As soon as you are in SDAM the blinking LED procedure will start.

Error-codes are shown as follows:
1. n short blinks (the number of n indicates the error code number.),
2. a pause of 1.5 s,
3. n short blinks (for the next error),
4. when all the error-codes are displayed, the sequence finishes with a LED blink of 3 s,
5. the sequence starts again.

Example of error buffer: 12 9 6 0 0
After entering SDAM:
1. 12 short blinks followed by a pause of 1.5 s,
2. 9 short blinks followed by a pause of 1.5 s,
3. 6 short blinks followed by a pause of 1.5 s,
4. 1 long blink of 3 s to finish the sequence,
5. the sequence starts again.

5.6 Protections

If a fault situation is detected an error code will be generated and if necessary, the set will be put in the protection mode. Blinking of the red LED at a frequency of 3 Hz indicates the protection mode. In some error cases, the microprocessor does not put the set in the protection mode. The error codes of the error buffer can be read via the service menu (SDAM) or the blinking LED procedure.

To get a quick diagnosis the chassis has two service modes implemented:
- The Customer Service Mode (CSM).
- The Service Default Alignment Mode (SDAM). Start-up of the set in a predefined way and adjustment of the set via a menu and with the help of test patterns.

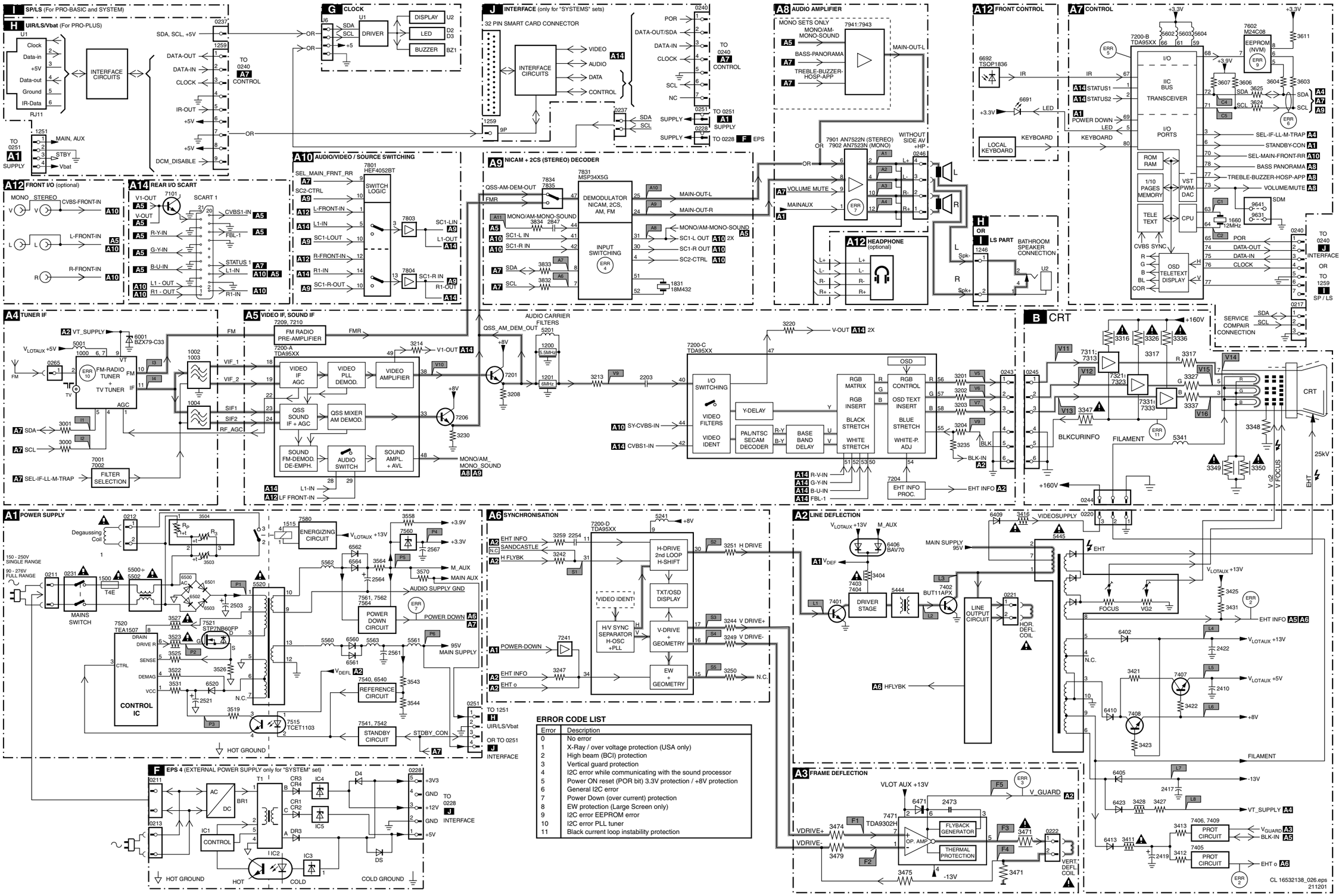
5.7 Repair Tips

Below some failure symptoms are given, followed by a repair tip.
- **Set is dead and makes hiccuping sound**
  'MainSupply' is available. Hiccuping stops when de-soldering L5561, meaning that problem is in the 'MainSupply' line. No output voltages at LOT, no horizontal deflection. Reason: line transistor TS7460 is defective.
- **Set is dead, and makes no sound**
  Check power supply IC7520. Result: voltage at pins 1, 3, 4, 5 and 6 are about 180 V and pin 8 is 0 V. The reason why the voltage on these pins is so high is because the output driver (pin 6) has an open load. That is why MOSFET TS7521 is not able to switch. Reason: feedback resistor 3523 is defective.Caution: be careful measuring on the gate of TS7521; circuitry is very high ohmic and can easily be damaged! (first connect measuring equipment to ground, then to the gate).
- **Set is in hiccup mode and shuts down after 8 s**.
  Blinking LED (set in SDAM mode) indicates error 5. As it is unlikely that P 'POR' and '+8V protection' happen at the same time, measure the '+8V'. If this voltage is missing, check transistor TS7480.
- **Set is non-stop in hiccup mode**
  Set is in over current mode; check the secondary sensing (opto coupler 7515) and the 'MainSupply' voltage. Signal 'Stdby_con' must be logic low under normal operation conditions and goes to high (3.3 V) under standby and fault conditions.
- **Set turns on, but without picture and sound**
  The screen shows snow, but OSD and other menus are okay. Blinking LED procedure indicates error 11, so problem is expected in the tuner (pos. 1000). Check presence of supply voltages. As 'Vlotaux+5V' at pin 5 and 7 are okay, 'VT_supply' at pin 9 is missing. Conclusion: resistor 3460 is defective.
- **Set turns on, but with a half screen at the bottom. Sound is okay**
  Blinking LED (set in SDAM mode) indicates error 3. Check 'Vlotaux+13V' and '+50V'. If they are okay, problem is expected in the vertical amplifier IC7471. Measure with a scope the waveform on pin 17 of the UOC. Measure also at pin 1 of IC7471. If here the signal is missing, a defective resistor R3244 causes the problem

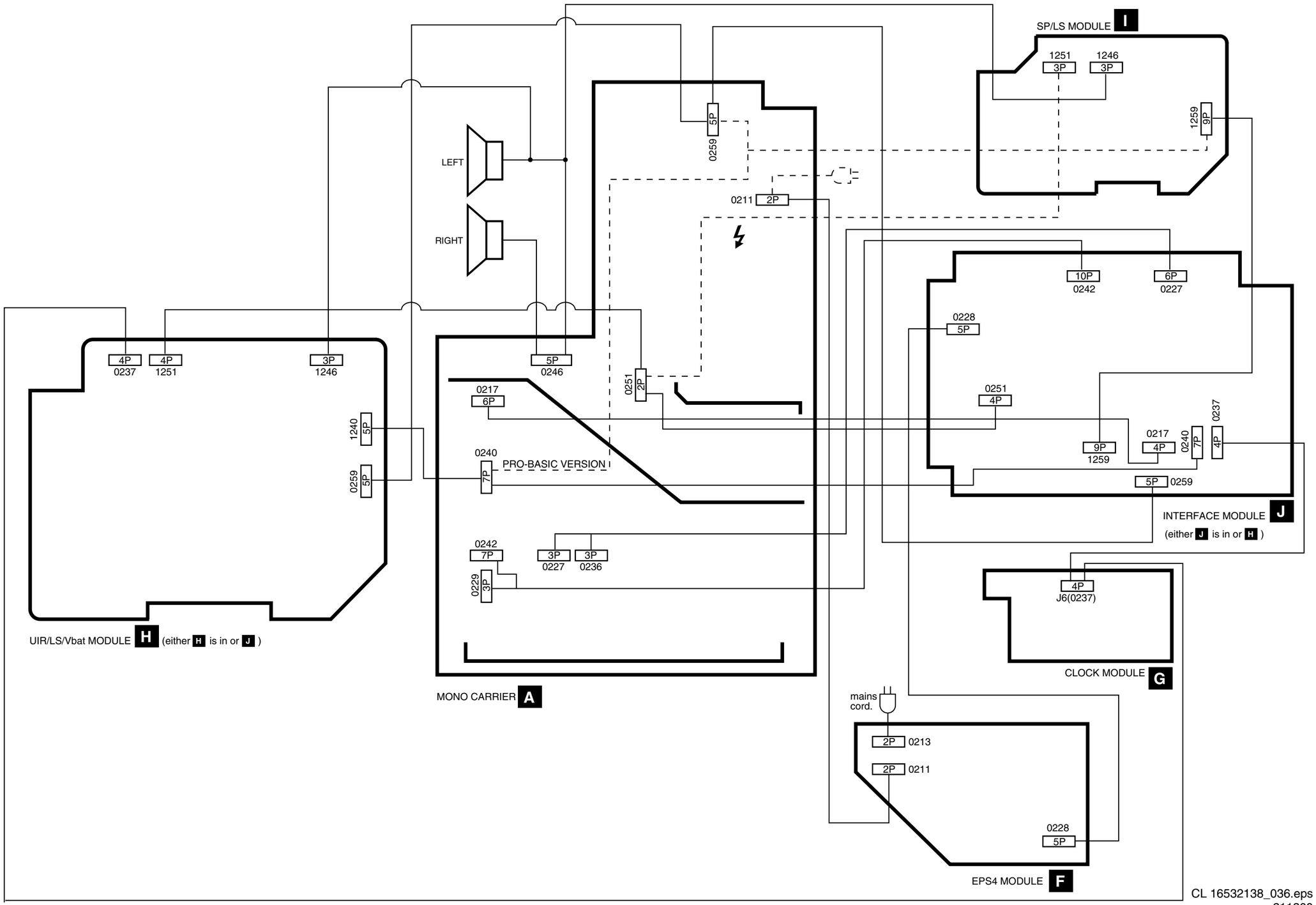
Personal Notes:

6. Block- and Wiring Diagram, Testpoints, I²C, and Supply Voltage Overview

Block Diagram



Wiring Diagram



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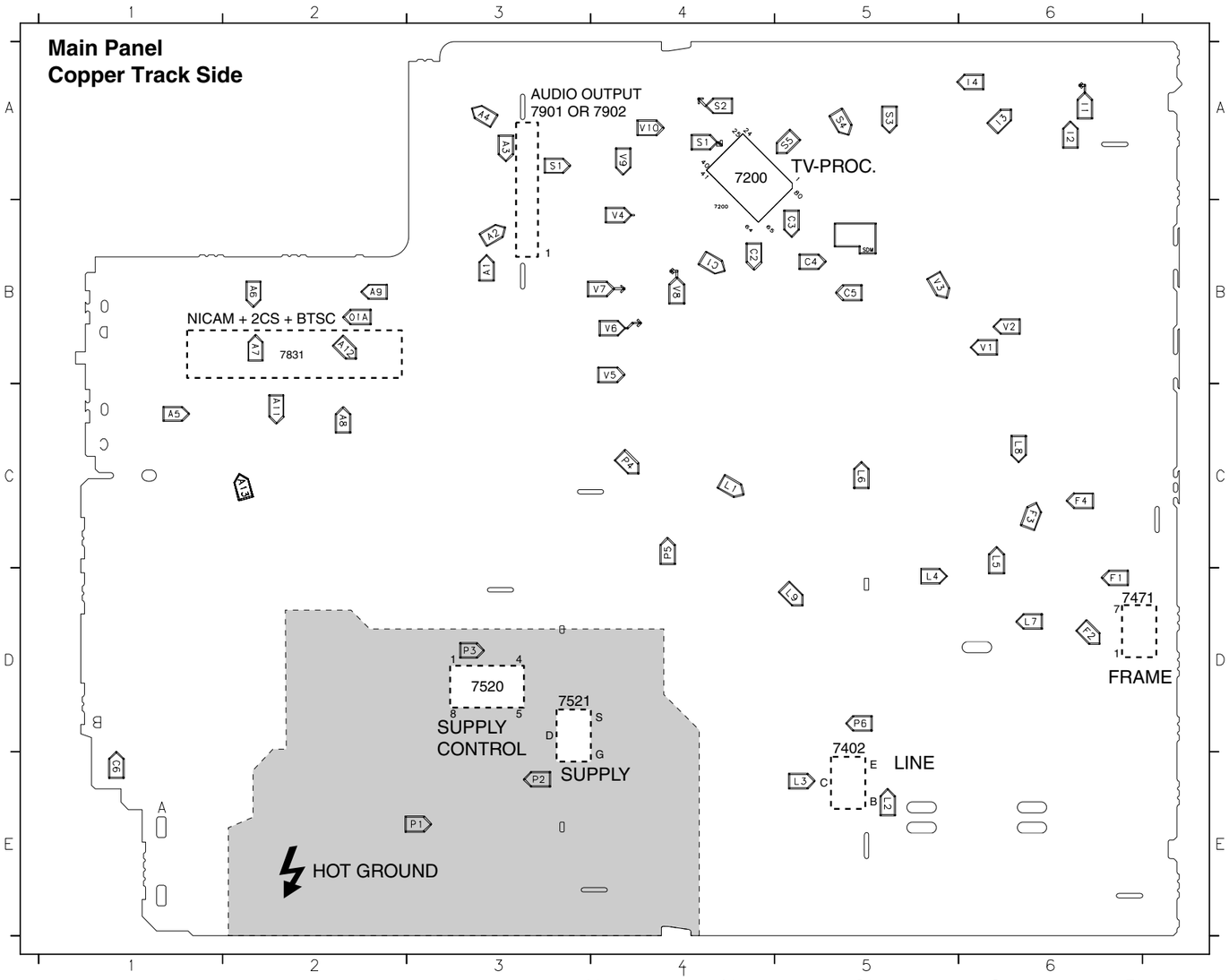
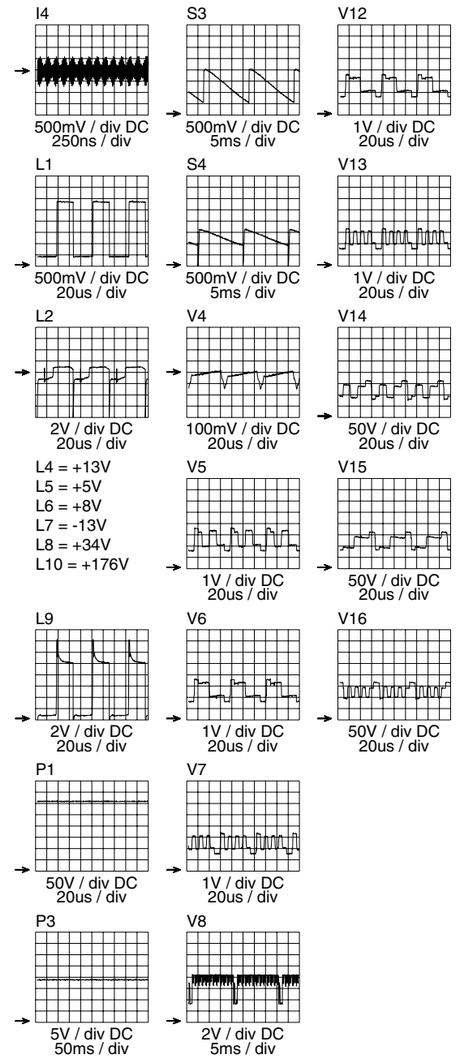
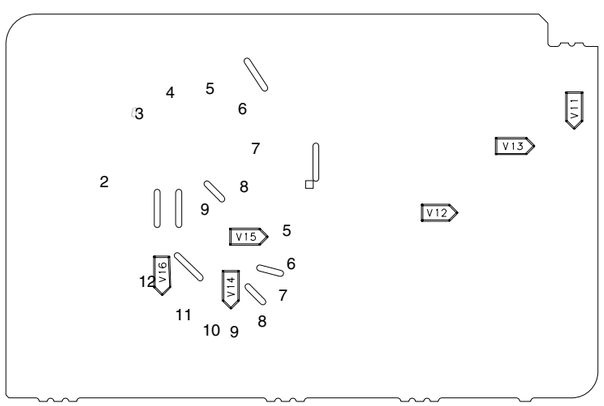
Testpoint Overview

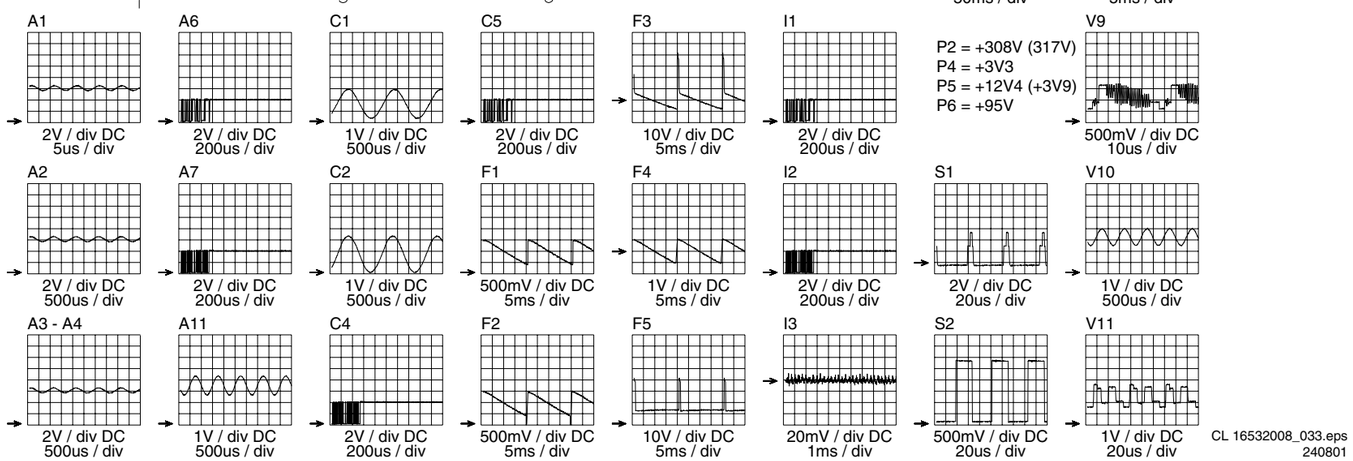


A1	B3
A2	B3
A3	A3
A4	A3
A5	C1
A6	B1
A7	B1
A8	C2
A9	B2
A10	B3
A11	C2
A12	B2
A13	C3
C1	B4
C2	B4
C3	B5
C4	B5
C5	B5
C6	E1
F1	D6
F2	D6
F3	C6
F4	C6
I1	A6
I2	A6
I3	A6
I4	A6
L1	C4
L2	E5
L3	E5
L4	D5
L6	C5
L8	C6
L9	D5
P1	E3
P2	E3
P3	D3
P4	C4
P5	C4
P6	D5
S1	A4
S2	A4
S3	A5
S4	A5
S5	A4
V1	B6
V2	B6
V3	B5
V4	B4
V5	B4
V6	B4
V7	B4
V8	B4
V9	A4
V10	A4



CRT Panel Copper Track Side





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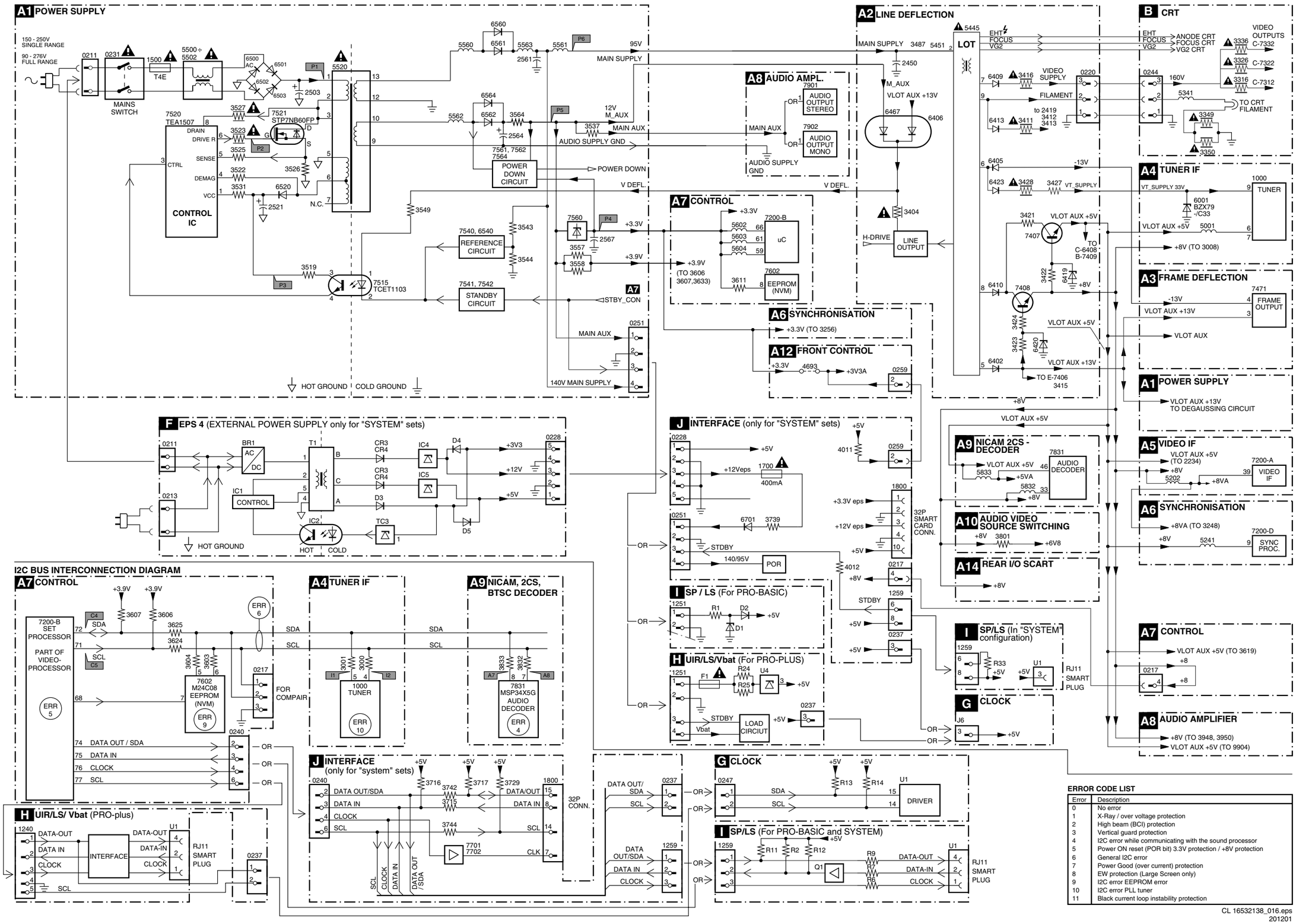
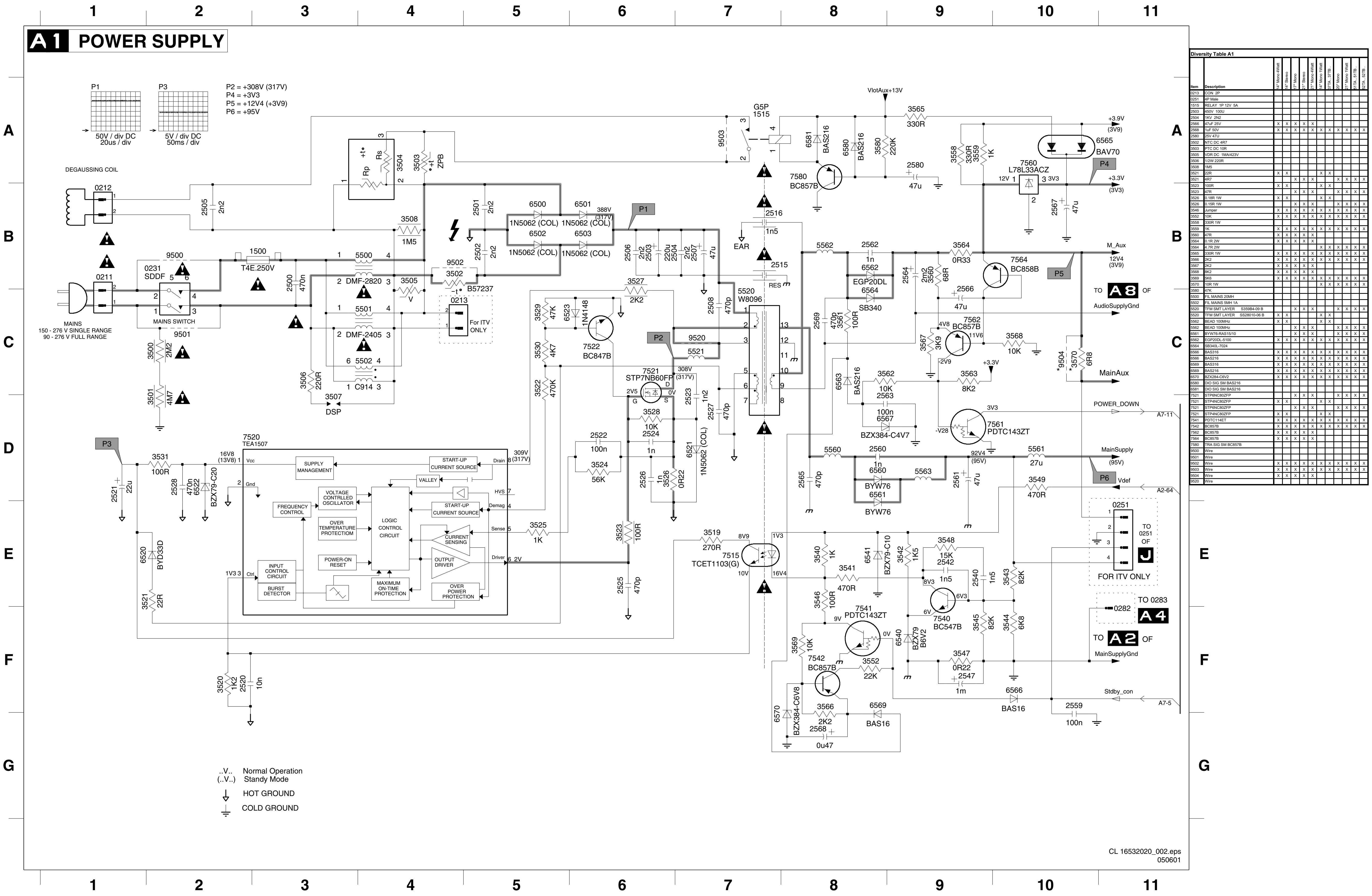
I²C and Supply Voltage Diagram



7. Schematics and PWB's

Mono Carrier: Power Supply

0211 B1	0282 F11	2502 B5	2507 B7	2521 D1	2526 D6	2547 F9	2563 D8	2568 G8	3502 B4	3507 D3	3522 C5	3527 B6	3540 E8	3545 F9	3552 F8	3562 C8	3567 C9	5500 B4	5560 D8	6501 B6	6522 D2	6561 D8	6566 F10	6581 A8	7540 F9	7562 C9	9502 B4
0212 B1	1500 B3	2503 B6	2508 C7	2522 D6	2527 D7	2559 F10	2564 B9	2569 C8	3503 A4	3508 B4	3523 E6	3528 D6	3541 E8	3546 E8	3558 A9	3563 C9	3568 C10	5501 C4	5561 D10	6502 B5	6523 C5	6562 B8	6567 D8	7515 E7	7541 F8	7564 B10	9503 A7
0213 C4	1515 A7	2504 B7	2515 B7	2523 D7	2528 D2	2560 D8	2565 D8	2580 A9	3504 A4	3519 E7	3524 D6	3529 C5	3542 E9	3547 F9	3559 A9	3564 B9	3569 F8	5502 C4	5562 B8	6503 B6	6540 F9	6563 C8	6569 F8	7520 D2	7542 F8	7580 A8	9504 C10
0231 B1	2500 B3	2505 B2	2516 B7	2524 D6	2540 E9	2561 D9	2566 C9	3500 C2	3505 B4	3520 F2	3525 E5	3530 C5	3543 E10	3548 E9	3560 B9	3565 A9	3570 C10	5520 B7	5563 D9	6520 E1	6541 E8	6564 C8	6570 G7	7521 C6	7560 A10	9500 B2	9520 C7
0251 E11	2501 B5	2506 B6	2520 F2	2525 E6	2542 E9	2562 B8	2567 B10	3501 D2	3506 C3	3521 E2	3526 D6	3531 D2	3544 F10	3549 D10	3561 C8	3566 F8	3580 A8	5521 C7	6500 B5	6521 D7	6560 D8	6565 A10	6580 A8	7522 C6	7561 D9	9501 C2	



A1 POWER SUPPLY
P2 = +308V (317V)
P4 = +3V3
P5 = +12V4 (+3V9)
P6 = +95V
50V / div DC 20us / div
5V / div DC 50ms / div
DEGAUSSING COIL
MAINS 150 - 276 V SINGLE RANGE 90 - 276 V FULL RANGE
MAINS SWITCH
7520 TEA1507
SUPPLY MANAGEMENT
START-UP CURRENT SOURCE
VALLEY
VOLTAGE CONTRLLED OSCILLATOR
FREQUENCY CONTROL
OVER TEMPERATURE PROTECTION
LOGIC CONTROL CIRCUIT
CURRENT SENSING
POWER-ON RESET
OUTPUT DRIVER
INPUT CONTROL CIRCUIT
BURST DETECTOR
MAXIMUM ON-TIME PROTECTION
OVER POWER PROTECTION
7521 STP7NB60FP
5520 W8096
7515 TCET1103(G)
7560 L78L33ACZ
6565 BAV70
7561 PDTC143ZT
7541 PDTC143ZT
7540 BC547B
7542 BC857B
7562 BC857B
7564 BC858B
7580 BC857B
7522 BC847B
FOR ITV ONLY
TO A8 OF AudioSupplyGnd
TO A4 TO 0283
TO A2 OF MainSupplyGnd
M_Aux
MainAux
POWER_DOWN
MainSupply
Stdby_con
..V.. Normal Operation
(..V..) Standy Mode
HOT GROUND
COLD GROUND
Diversity Table A1
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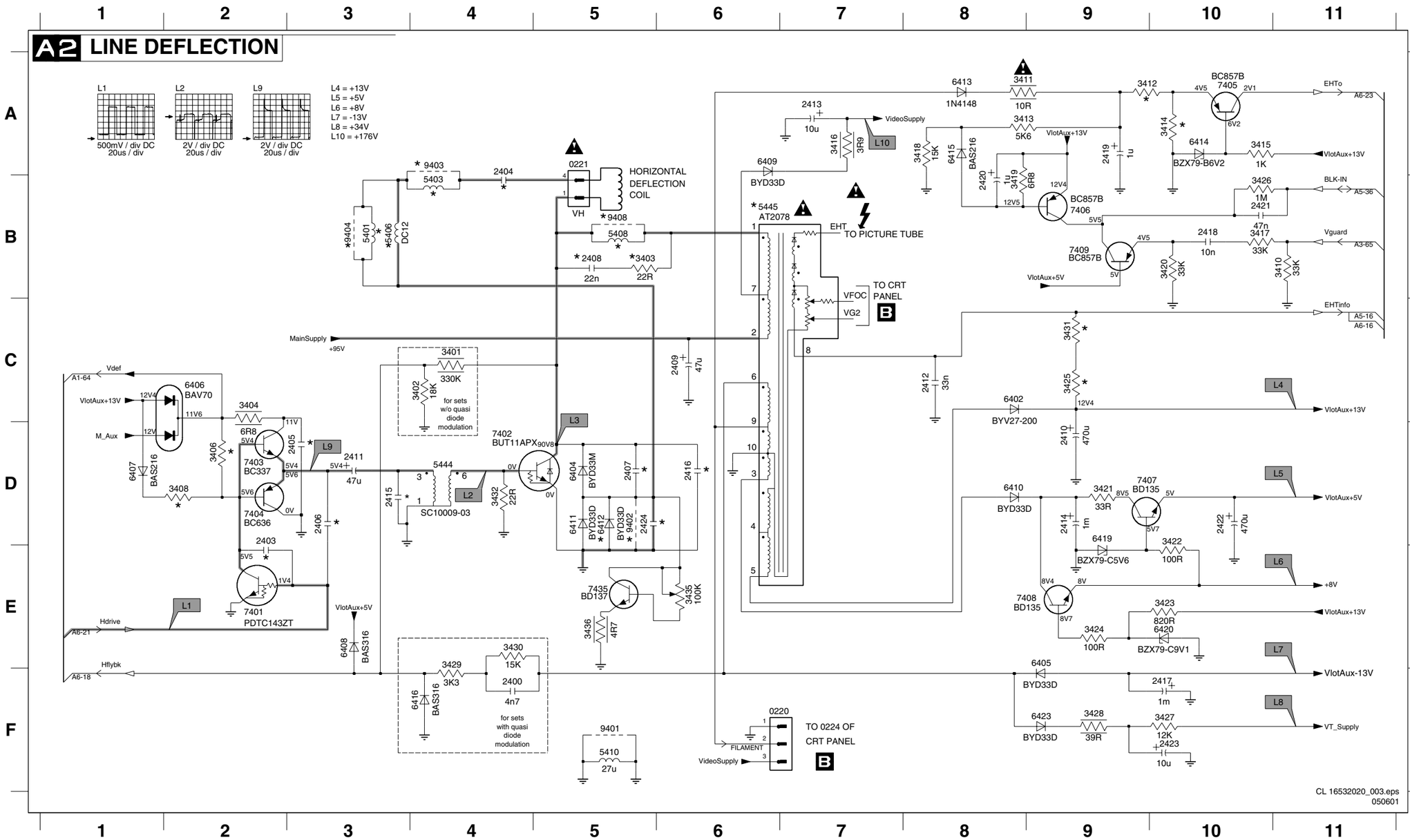
Mono Carrier: Line Deflection

A2 LINE DEFLECTION



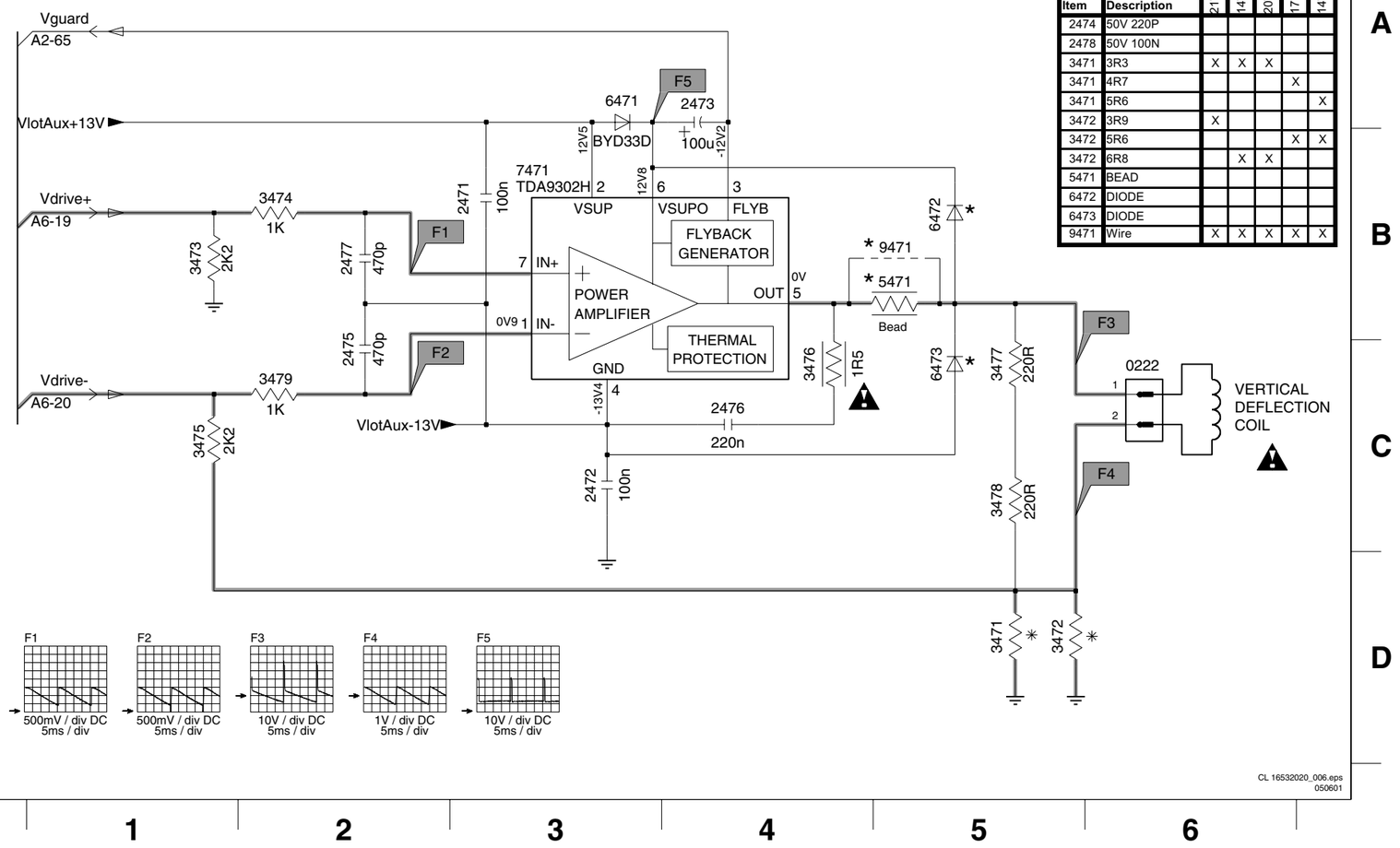
Mono Carrier: Frame Deflection

Diversity Table A2						
Item	Description	21"	20"	17"	14" Black matrix	14" Black line
2401	50V 680P					
2402	250V 680N					
2403	capacitor					
2404	560nF 250V	X				
2404	680nF 250V		X			
2404	390nF 250V			X		
2404	470nF 250V				X	X
2405	1N 50V	X	X	X	X	X
2406	50V 330P					
2407	9nF1 1.6kV			X	X	X
2407	11nF 1.6kV	X				
2407	12nF 1.6kV		X			
2408	22nF 50V	X	X		X	X
2408	47nF 50V			X		
2415	capacitor					
2416	220pF 2kV				X	X
2416	470pF 2kV	X				
2416	560pF 2kV			X		
2416	2.2nF 2kV		X			
2424	47N 100V	X	X	X	X	X
3221	1/6W 560R					
3222	1/6W 100R					
3401	330K					
3402	1/6W 18K					
3403	22R	X	X	X	X	X
3406	1/6W 10K	X	X	X	X	X
3407	220R					
3408	8K2 1/6W	X	X	X	X	X
3412	39K	X	X	X	X	X
3414	12K	X	X	X	X	X
3425	12K	X	X		X	X
3425	18K			X		
3431	100R			X		
3431	1K	X				
3431	2K7		X			
3431	4K7				X	
3431	5K6					X
5401	68U					
5403	10U	X	X	X		
5406	COI LINCOR DRUM	X		X		
5406	COI LINCOR DRUM		X			
5408	22U		X			
5408	27U	X		X	X	X
5445	TFM 1142.5093D B	X	X	X	X	X
6401	DIO SIG BAV21					
6412	BYD33D	X	X	X	X	X
7402	TRA POW BUT11APX					
7407	TRA POW BD135-16					
7408	TRA POW BD135-16					
9402	Wire					
9403	Wire				X	X
9404	Wire				X	X
9408	Wire					

0222 C6 2471 B3 2472 C3 2473 A4 2475 C2 2476 C4 2477 B2 3471 D5 3472 D5 3473 B1 3474 B2 3475 C1 3476 C4 3477 C5 3478 C5 3479 C2 5471 B5 6471 A3 6472 B5 6473 C5 7471 B3 9471 B5

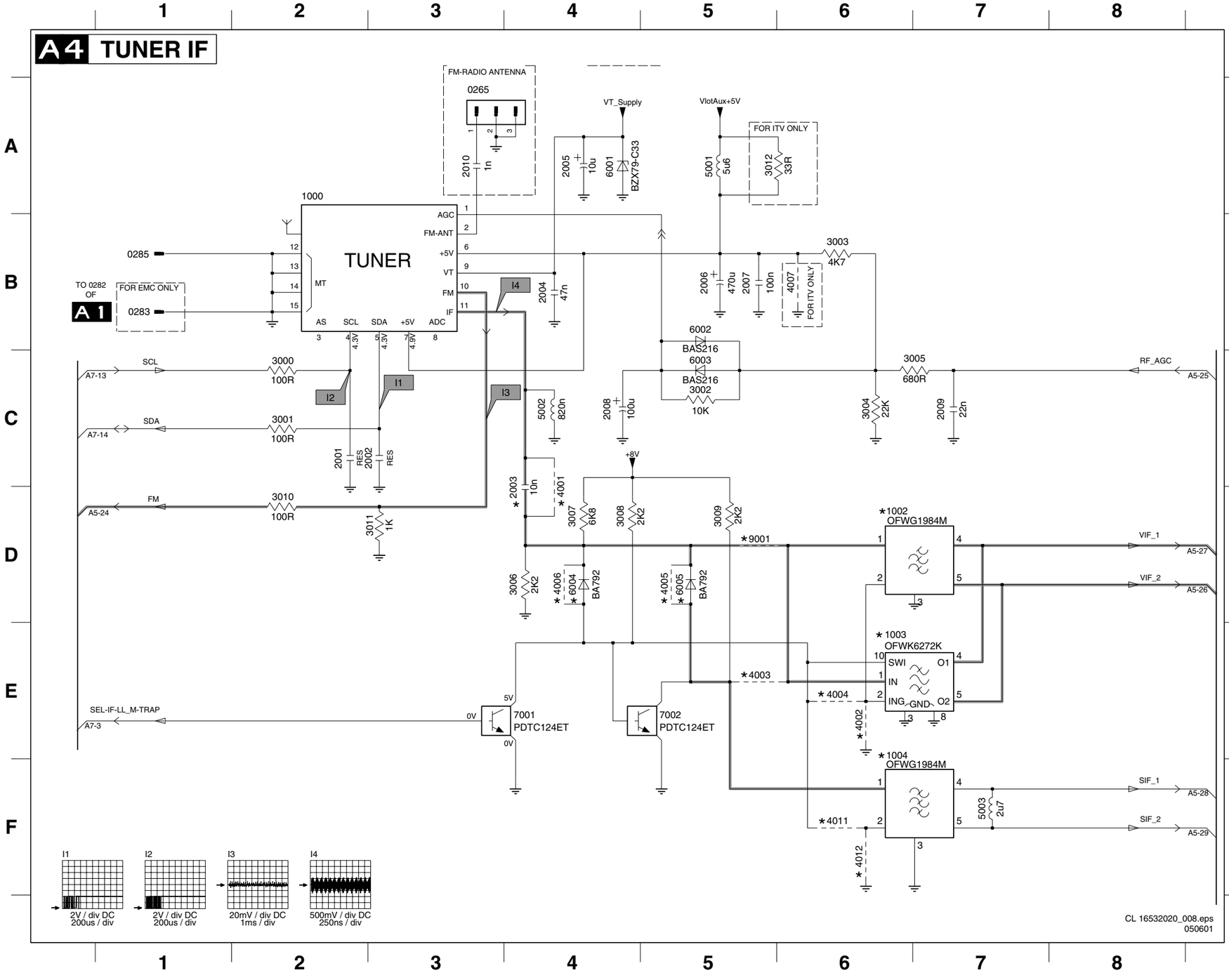
A3 FRAME DEFLECTION

Diversity Table A3						
Item	Description	21"	14" Black line	20"	17"	14" Black matrix
2474	50V 220P					
2478	50V 100N					
3471	3R3	X	X	X		
3471	4R7				X	
3471	5R6					X
3472	3R9	X				
3472	5R6				X	X
3472	6R8		X	X		
5471	BEAD					
6472	DIODE					
6473	DIODE					
9471	Wire	X	X	X	X	X



Mono Carrier: Tuner IF

0265 A3 0285 B1 1002 D6 1004 E6 2002 C2 2004 B4 2006 B5 2008 C4 2010 A3 3001 C2 3003 B6 3005 C7 3007 D4 3009 D5 3011 D3 4001 C4 4003 E5 4005 D5 4007 B6 4012 F6 5002 C4 6001 A4 6003 C5 6005 D5 7002 E5
0283 B1 1000 A2 1003 E6 2001 C2 2003 D4 2005 A4 2007 B5 2009 C7 3000 C2 3002 C5 3004 C6 3006 D4 3008 D4 3010 D2 3012 A5 4002 E6 4004 E6 4006 D4 4011 F6 5001 A5 5003 F7 6002 B5 6004 D4 7001 E4 9001 D5

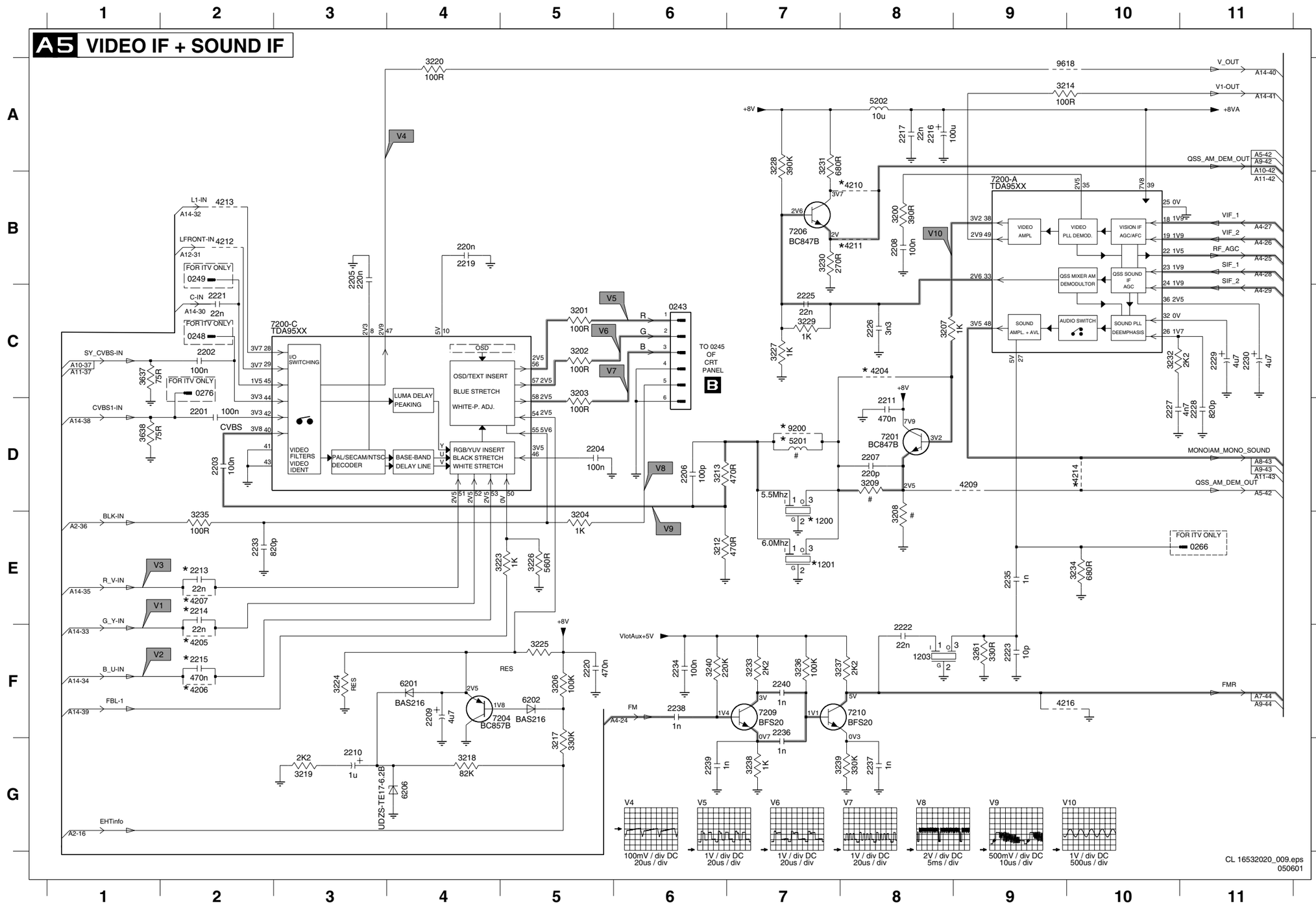


Diversity Table A4

Item	Description	14", 21" Stereo 3W, PAL BG-I	14", 17", 21" Mono 4W, PAL BG-I	14", 21" Stereo 3W, PAL, SECAM L-L1	14", 17", 21" Mono 4W, PAL, SECAM L-L1	14", 21" Stereo 3W, East Europe	14", 17", 21" Mono 4W, East Europe	14", 20", 21" Mono 1W, PAL BG-I	14", 20", 21" Mono 1W, PAL, SECAM L-L1	14", 20", 21" Mono 1W, East Europe
0265	3P	X	X	X	X	X	X			
0285	1P									
1000	TUN V+U PLL IEC BGDK							X	X	X
1000	TUNER UR1316R/A I -3	X	X	X	X	X	X			
1002	OFWK3953M			X	X				X	
1003	OFWK6289K	X	X			X	X	X		X
1004	OFWK9656M			X	X				X	
2003	50V 10N	X	X	X	X	X	X	X	X	X
2010	1N	X	X	X	X	X	X			
3002	10K			X	X				X	
3002	Jumper	X	X			X	X	X		X
3004	8K2									
3010	330R	X		X		X				
3010	Jumper		X		X		X			
3011	330R		X		X		X			
4001	Jumper									
4002	Jumper	X	X	X	X	X	X	X	X	X
4003	Jumper			X	X				X	
4004	Jumper									
4005	Jumper									
4006	Jumper									
4011	Jumper			X	X				X	
4012	Jumper									
4608	Jumper	X	X	X	X	X	X			
4609	Jumper	X	X	X	X	X	X			
5003	1U8			X	X				X	
6002	BAS316			X	X				X	
6002	BAS216			X	X				X	
6004	BA792	X	X	X	X	X	X	X	X	X
6005	BA792									
9001	Wire	X	X	X	X	X	X	X	X	X

Mono Carrier: Video IF + Sound IF

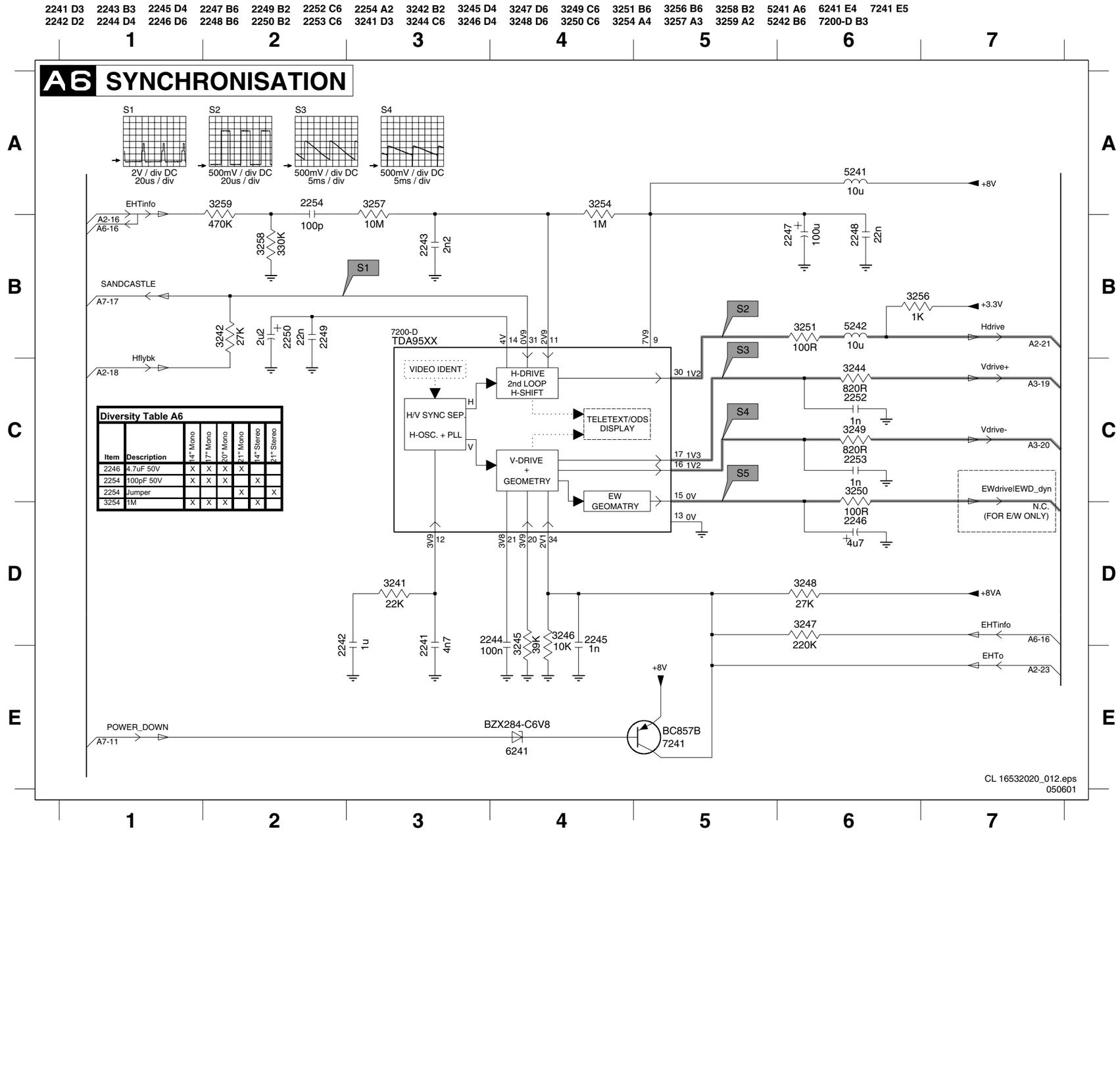
A5 VIDEO IF + SOUND IF



Mono Carrier: Synchronisation

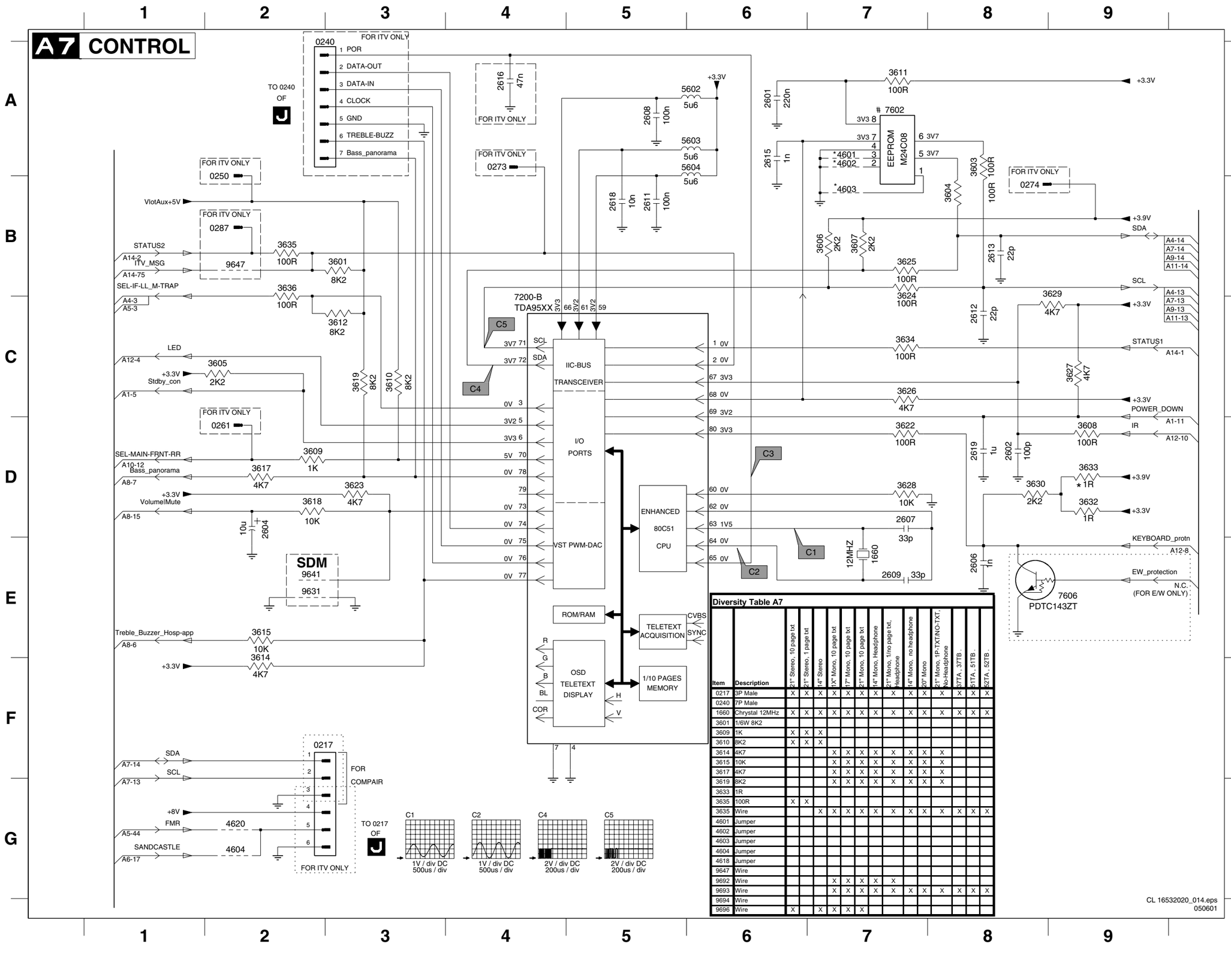
Diversity Table A5

Item	Description	1* Stereo, 1page txt, PAL, SECAM L+L1	1* Stereo, 2-outputs	4* Mono, Watt, No txt, Headphone, PAL, SECAM L+L1	4* Mono, Watt, 1page txt, Headphone	4* Stereo, PAL, SECAM L+L1R	10* Mono, PAL, SECAM L+L1, 1page txt	17TA, PAL, SECAM L+L1, 1page txt	17ATB, PAL, SECAM L+L1, 1page txt	20* Mono, PAL, SECAM L+L1, no txt	21TA, PAL, SECAM L+L1, no txt	21ATB, PAL, SECAM L+L1, no txt	4* Mono, 4Watt	7* Mono, 4Watt	21* Mono, 4Watt	1* Stereo, 1 page txt, East Europe	1* Stereo, 1cust	1* Mono 1Watt	4* Mono, Watt, No txt, Headphone, East Europe	1* Stereo, East Europe	1* Mono 1Watt	4* Stereo, East Europe	4* Mono, Watt, 1page txt, No-Headphone	20* Mono, East Europe, 1page txt	21* Mono 1Watt	4* Mono, Watt, No txt, No-Headphone	20* Mono, East Europe, no txt	21* Mono 1Watt
1200	Chrystal 5M5/5MT4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1201	Chrystal 5M5/5MT/6M5															X	X	X	X	X	X	X	X	X	X	X	X
1202	Chrystal 4MHZ5																										
1203	Chrystal 10MHz													X	X	X											
2202	100nF 25V	X	X	X	X	X								X	X	X	X	X	X	X	X	X	X				
2207	68pF 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2213	22N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2214	22N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2215	22N 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2220	470nF 50V	X	X														X	X									
2221	22nF 25V	X	X														X	X									
2222	10nF 50V													X	X	X											
2223	10pF 50V													X	X	X											
2225	220nF 25V			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
2226	3.9nF 50V			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
2227	4.7nF 50V			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
2228	820pF 50V			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
2229	10uF 50V			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
2230	4.7uF 50V	X	X	X	X	X	X	X	X	X	X	X	X	X	X													
2234	100nF 25V		X				X							X	X	X		X				X					
2235	1nF 50V		X											X	X	X											
2238	1nF 50V		X				X							X	X	X						X					
2239	1nF 50V		X				X											X				X					
2240	1nF 50V		X				X							X	X	X		X				X					
3208	150R													X	X	X	X	X	X	X	X	X	X	X	X	X	X
3208	390R	X	X	X	X	X	X	X	X	X	X	X	X														
3210	1/6W 4K7																										
3211	1/6W 4K7																										
3220	100R	X	X														X	X									
3227	100K			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
3228	100K			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
3229	820R	X	X			X																					
3230	1K			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
3230	270R	X	X																								
3231	560R	X	X			X																					
3231	Jumper			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
3232	2K2			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
3233	820R		X			X								X	X	X		X				X					
3234	680R													X	X	X											
3236	100K													X	X	X											
3236	150K		X			X												X				X					
3237	1K2		X			X												X				X					
3237	330R													X	X	X											
3238	270R													X	X	X											
3238	560R		X			X												X				X					
3239	270R		X			X												X				X					
3239	330R													X	X	X											
3240	100K		X			X								X	X	X		X				X					
3261	330R													X	X	X											
4204	Jumper																										
4205	Jumper																										
4206	Jumper																										
4207	Jumper																										
4209	Jumper																X	X				X					
4210	Jumper	X	X			X																					
4211	Jumper			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
4212	Jumper			X	X									X	X	X			X	X	X						
4213	Jumper			X	X		X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
4214	Jumper																										
4216	Jumper	X		X	X		X	X	X	X	X	X	X				X		X	X	X		X	X	X	X	X	X
5201	4U7	X	X	X	X	X	X	X	X	X	X	X	X														
7200	TDA9551H/N1/3																X		X	X	X						
7200	TDA9552H/N1/3	X			X		X	X	X	X																	
7200	TDA9567H/N1/5		X			X																					
7200	TDA9571H/N1/3																	X	X							X	X
7200	TDA9572H/N1/3			X						X	X	X															
7200	TDA9561H/N1/5													X	X	X		X				X					
7202	TRA SIG SM BC857B																										
7203	TRA SIG SM BC857B																										
7205	TRA SIG SM BC857B																										
7206	BC847C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X	X
7209	BFS20		X			X								X	X	X		X				X					
7210	BFS20		X			X								X	X	X		X				X					
9200	Wire																										
9298	Wire																										
9299	Wire																										
9618	Wire	X	X														X	X									



Mono Carrier: Control

A7 CONTROL



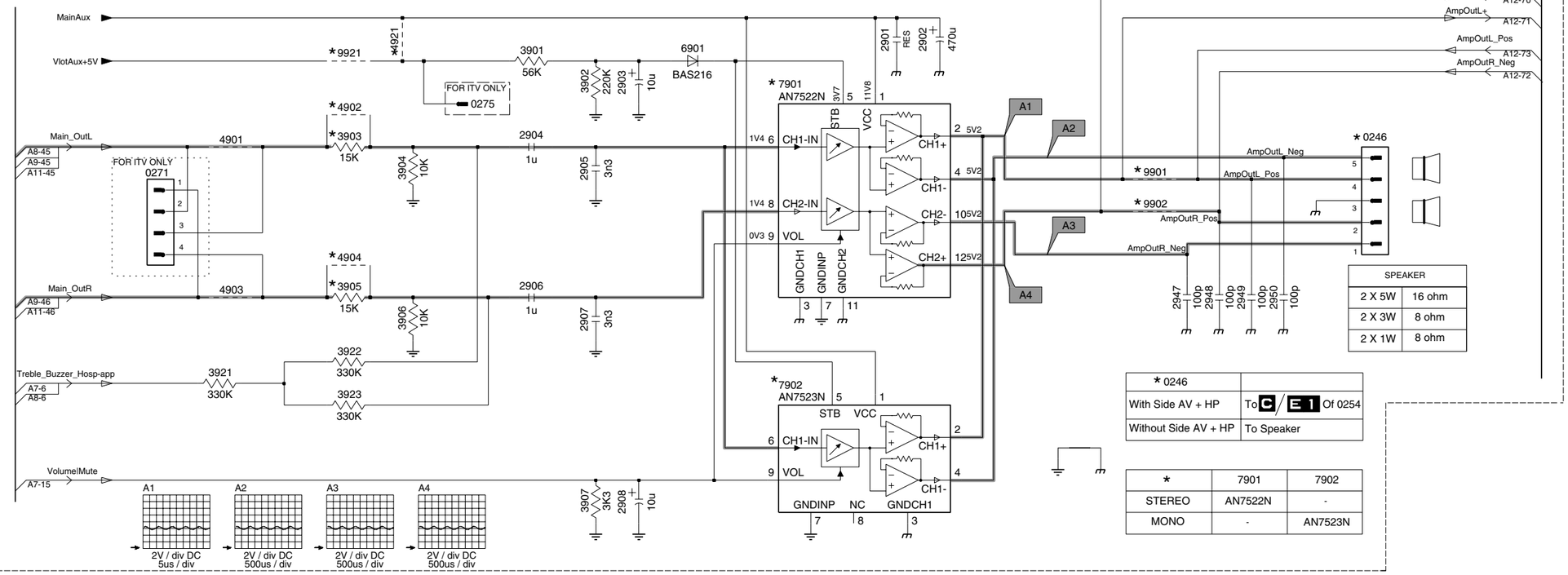
Diversity Table A7

Item	Description	21" Stereo, 10 page txt	21" Stereo, 1 page txt	14" Stereo	1X" Mono, 10 page txt	17" Mono, 10 page txt	21" Mono, 10 page txt	14" Mono, Headphone	21" Mono, 1/no page txt, Headphone	14" Mono, no headphone	20" Mono	21" Mono, 1P-TXT/NO-TXT, No-Headphone	37TA, 37TB	51TA, 51TB	52TA, 52TB
0217	3P Male	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0240	7P Male														
1660	Chrystal 12MHz	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3601	1/6W 8K2														
3609	1K	X	X	X											
3610	8K2	X	X	X											
3614	4K7				X	X	X	X	X	X	X	X			
3615	10K				X	X	X	X	X	X	X	X			
3617	4K7				X	X	X	X	X	X	X	X			
3619	8K2				X	X	X	X	X	X	X	X			
3633	1R														
3635	100R	X	X												
3635	Wire			X	X	X	X	X	X	X	X	X	X	X	X
4601	Jumper														
4602	Jumper														
4603	Jumper														
4604	Jumper														
4618	Jumper														
9647	Wire														
9692	Wire				X	X	X	X	X						
9693	Wire				X	X	X	X	X	X	X	X	X	X	X
9694	Wire														
9696	Wire	X		X	X	X	X								

Mono Carrier: Audio Amplifier + Mono Sound Processing

A8 AUDIO_AMPLIFIER + MONO_SOUND_PROCESSING

AUDIO AMPLIFIER

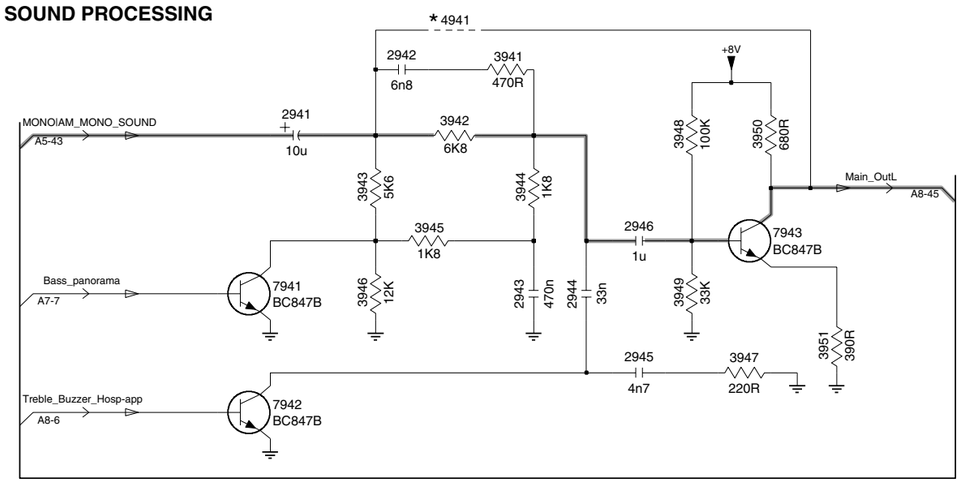


SPEAKER	
2 X 5W	16 ohm
2 X 3W	8 ohm
2 X 1W	8 ohm

*0246	
With Side AV + HP	To C / E 1 Of 0254
Without Side AV + HP	To Speaker

*	7901	7902
STEREO	AN7522N	-
MONO	-	AN7523N

MONO SOUND PROCESSING



(Mono sets only)

Diversity Table A8

Item	Description	1"X" Mono, XWatt	1"7" Mono, 4Watt	1"1" Mono, 4Watt	1"4" Mono, 1Watt, No-Headphone, Smart Sound	1"0" Mono, 1Watt, No-Headphone	1"1" Mono, 1Watt, No-Headphone	1"4" Mono, 1Watt, Headphone	1"1" Mono, 1Watt, Headphone	1"4" Mono, 1Watt, No-Headphone, No-Smart Sound	2"7TA/TB - Mono, 1Watt, No-Headphone	2"1TA/TB - Mono, 1Watt, No-Headphone	2"2TA/TB - Mono, 1Watt, No-Headphone	2"7TA/TB - Mono, 1Watt, Headphone	2"1TA/TB - Mono, 1Watt, Headphone	2"2TA/TB - Mono, 1Watt, Headphone	2"1" Stereo, Side AV	1"4" Stereo	2"1" Stereo, Non Side AV
0246	3P,Male	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0246	5P,Male																X	X	X
1831	Chrystal 18.432MHz																X	X	X
2904	1uF 16V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
2904	470nF 16V																X	X	X
2906	470nF 16V																X	X	X
2907	1nF 50V	X	X	X													X	X	X
2941	1uF 50V	X	X	X	X	X	X	X	X										
2941	10uF 50V									X	X	X	X	X	X	X			
2942	33nF 50V	X	X	X	X	X	X	X	X										
2943	100nF 16V	X	X	X	X	X	X	X	X										
2944	47nF 50V	X	X	X	X	X	X	X	X										
2945	10nF 50V	X	X	X	X	X	X	X	X										
2946	1uF 16V	X	X	X	X	X	X	X	X										
3903	3K3																X	X	X
3903	6K2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
3905	3K3																X	X	X
3906	10K																X	X	X
3921	330K																		
3922	330K																		
3941	100R	X	X	X	X	X	X	X	X										
3942	3K9	X	X	X	X	X	X	X	X										
3943	2K7	X	X	X	X	X	X	X	X										
3944	2K7	X	X	X	X	X	X	X	X										

Diversity Table A8

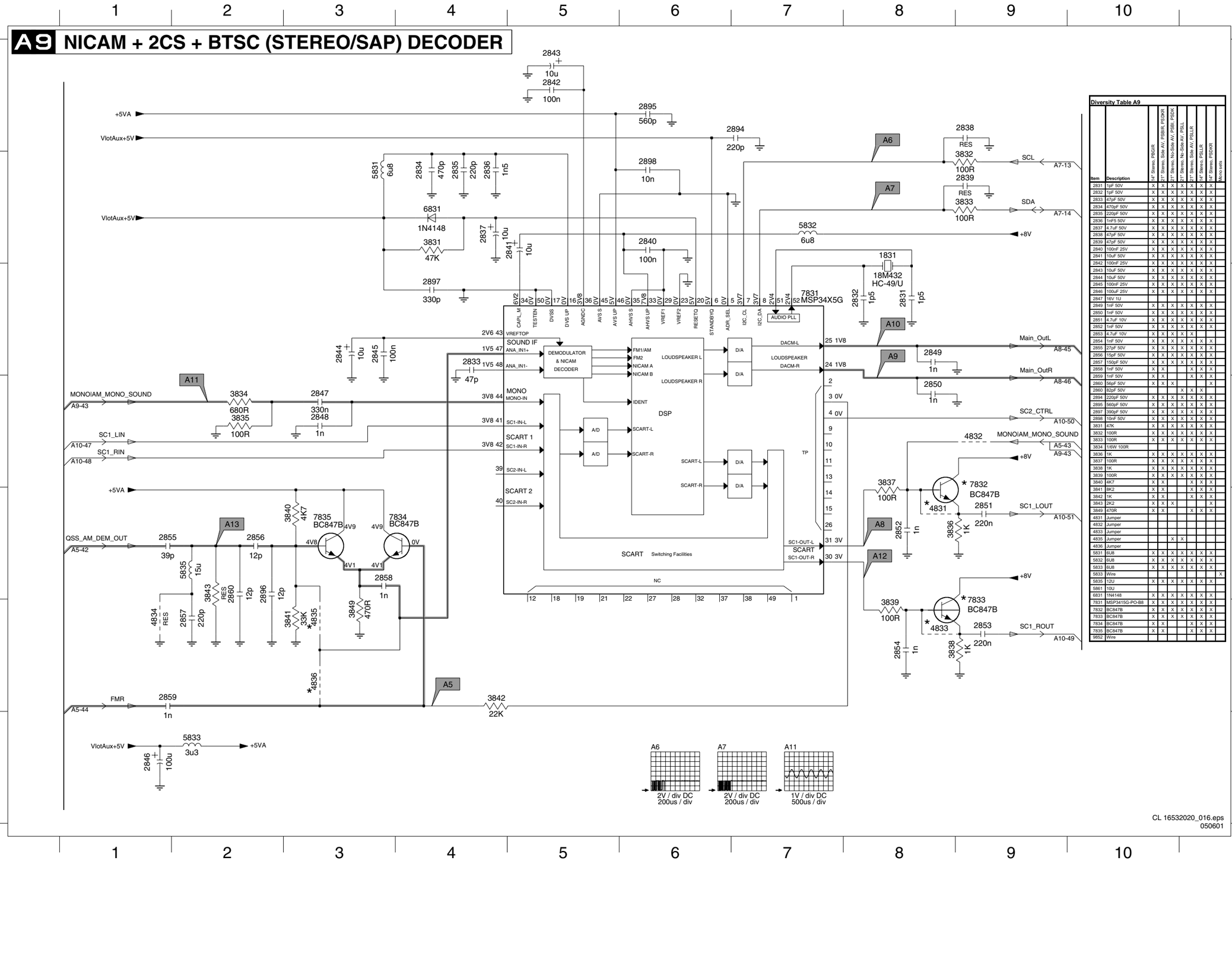
Item	Description	1"X" Mono, XWatt	1"7" Mono, 4Watt	1"1" Mono, 4Watt	1"4" Mono, 1Watt, No-Headphone, Smart Sound	1"0" Mono, 1Watt, No-Headphone	1"1" Mono, 1Watt, No-Headphone	1"4" Mono, 1Watt, Headphone	1"1" Mono, 1Watt, Headphone	1"4" Mono, 1Watt, No-Headphone, No-Smart Sound	2"7TA/TB - Mono, 1Watt, No-Headphone	2"1TA/TB - Mono, 1Watt, No-Headphone	2"2TA/TB - Mono, 1Watt, No-Headphone	2"7TA/TB - Mono, 1Watt, Headphone	2"1TA/TB - Mono, 1Watt, Headphone	2"2TA/TB - Mono, 1Watt, Headphone	2"1" Stereo, Side AV	1"4" Stereo	2"1" Stereo, Non Side AV
3945	1K	X	X	X	X	X	X	X	X	X									
3946	18K	X	X	X	X	X	X	X	X										
3947	330R	X	X	X	X	X	X	X	X										
3948	47K	X	X	X	X	X	X	X	X										
3949	15K	X	X	X	X	X	X	X	X										
3950	560R	X	X	X	X	X	X	X	X										
3951	390R	X	X	X	X	X	X	X	X										
4901	Jumper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4902	Jumper																		
4903	Jumper																X	X	X
4904	Jumper																		
4921	Jumper																		
4941	Jumper									X	X	X	X	X	X	X			
7901	AN7522N	X	X	X													X	X	X
7902	AN7523N				X	X	X	X	X	X	X	X	X	X	X	X			
7941	BC847B	X	X	X	X	X	X	X	X										
7942	BC847B	X	X	X	X	X	X	X	X										
7943	BC847B	X	X	X	X	X	X	X	X										
9901	Wire				X	X	X			X	X	X	X						
9902	Wire				X	X	X			X	X	X	X						
9913	Wire																X	X	X
9914	Wire																X	X	X
9921	Wire	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

CL 16532020_015.eps
010601

0246 B10
0271 B2
0275 B4
2901 A7
2902 A7
2903 B5
2904 B4
2905 B5
2906 C4
2907 C5
2908 E5
2941 F3
2942 F3
2943 G4
2944 G4
2945 G4
2946 G4
2947 C9
2948 C9
2949 C9
2950 C9
3901 B4
3902 B5
3903 B3
3904 B4
3905 C3
3906 C4
3907 E5
3921 D2
3922 D3
3923 D3
3941 F4
3942 F3
3943 F3
3944 F4
3945 G3
3946 G3
3947 G5
3948 F5
3949 G5
3950 F5
3951 G5
4901 B2
4902 B3
4903 C2
4904 C3
4921 A4
4941 F3
6901 B6
7901 B6
7902 D6
7941 G2
7942 H2
7943 G5
9901 B9
9902 C9
9921 B3

Mono Carrier: NICAM + 2CS + BTSC (Stereo / SAP) Decoder

A9 NICAM + 2CS + BTSC (STEREO/SAP) DECODER

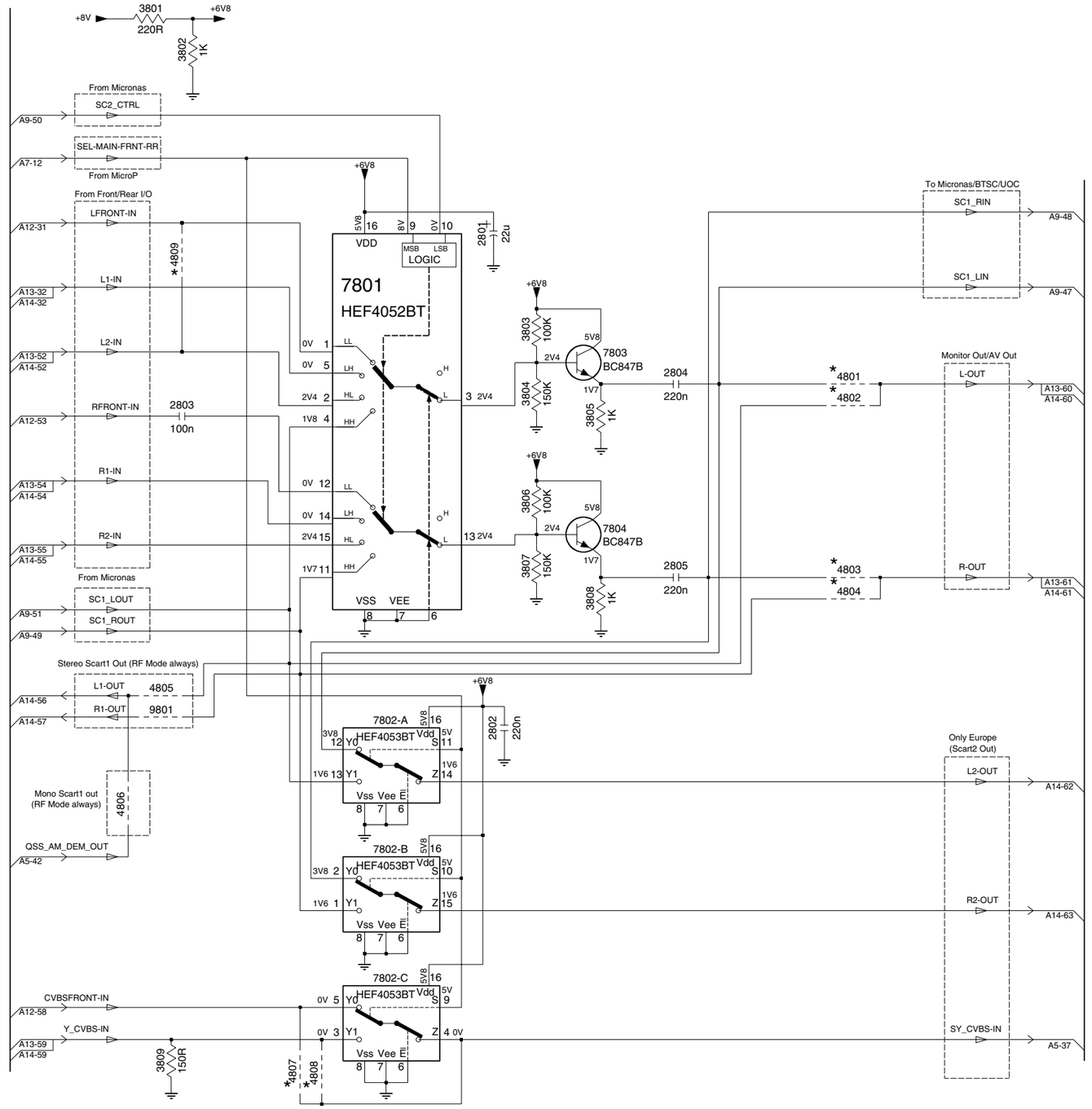


Diversity Table A9

Item	Description	14" Stereo, PSGR	21" Stereo, Side AV, PSBR, PSDR1	21" Stereo, No-Side AV, PSBI, PSDI	21" Stereo, No-Side AV, PSLL	21" Stereo, Side AV, PSLLR	14" Stereo, PSLLR	14" Stereo, PSLL	14" Stereo, PSDI/R	Mono-sets	
2831	1pF 50V	X	X	X	X	X	X	X			
2832	1pF 50V	X	X	X	X	X	X	X			
2833	47pF 50V	X	X	X	X	X	X	X			
2834	470pF 50V	X	X	X	X	X	X	X			
2835	220pF 50V	X	X	X	X	X	X	X			
2836	1nF5 50V	X	X	X	X	X	X	X			
2837	4,7uF 50V	X	X	X	X	X	X	X			
2838	47pF 50V	X	X	X	X	X	X	X			
2839	47pF 50V	X	X	X	X	X	X	X			
2840	100nF 25V	X	X	X	X	X	X	X			
2841	10uF 50V	X	X	X	X	X	X	X			
2842	100nF 25V	X	X	X	X	X	X	X			
2843	10uF 50V	X	X	X	X	X	X	X			
2844	10uF 50V	X	X	X	X	X	X	X			
2845	100nF 25V	X	X	X	X	X	X	X			
2846	100uF 25V	X	X	X	X	X	X	X			
2847	1ßV 1U										
2849	1nF 50V	X	X	X	X	X	X	X			
2850	1nF 50V	X	X	X	X	X	X	X			
2851	4,7uF 10V	X	X	X	X	X	X	X			
2852	1nF 50V	X	X	X	X	X	X	X			
2853	4,7uF 10V	X	X	X	X	X	X				
2854	1nF 50V	X	X	X	X	X	X	X			
2855	27pF 50V	X	X	X	X	X	X	X			
2856	15pF 50V	X	X	X	X	X	X	X			
2857	150pF 50V	X	X	X	X	X	X	X			
2858	1nF 50V	X	X			X	X	X			
2859	1nF 50V	X	X			X	X	X			
2860	56pF 50V	X	X	X			X				
2860	82pF 50V				X	X	X				
2894	220pF 50V	X	X	X	X	X	X	X			
2895	560pF 50V	X	X	X	X	X	X	X			
2897	390pF 50V	X	X	X	X	X	X	X			
2898	10nF 50V	X	X	X	X	X	X	X			
3831	47K	X	X	X	X	X	X	X			
3832	100R	X	X	X	X	X	X	X			
3833	100R	X	X	X	X	X	X	X			
3834	1/8W 100R										
3836	1K	X	X	X	X	X	X	X			
3837	100R	X	X	X	X	X	X	X			
3838	1K	X	X	X	X	X	X	X			
3839	100R	X	X	X	X	X	X	X			
3840	4K7	X	X			X	X	X			
3841	8K2	X	X			X	X	X			
3842	1K	X	X			X	X	X			
3843	2K2	X	X	X				X			
3849	470R	X	X			X	X	X			
4831	Jumper										
4832	Jumper										
4833	Jumper										
4835	Jumper			X	X						
4836	Jumper										
5831	6u8	X	X	X	X	X	X	X			
5832	6u8	X	X	X	X	X	X	X			
5833	6u8	X	X	X	X	X	X	X			
5833	Wire										X
5835	12U	X	X	X	X	X	X	X			
5861	10U										
6831	1N4148	X	X	X	X	X	X	X			
7831	MSP3415G-PO-B8	X	X	X	X	X	X	X			
7832	BC847B	X	X	X	X	X	X	X			
7833	BC847B	X	X	X	X	X	X	X			
7834	BC847B	X	X			X	X	X			
7835	BC847B	X	X			X	X	X			
8852	Wire										

Mono Carrier: Audio / Video Source Switching

A1Ø AUDIO/VIDEO SOURCE SWITCHING



EU	Output			HEF Logic (MSB … LSB)	
	Scart1	Scart2	Monitor	SEL-MAIN-FRNT-RR	SC2_CTRL
Front In	RF Mode	Front Mode	Front Mode	0	0
Scart 1 in	RF Mode	Scart1 Mode	Scart1 Mode	0	1
Scart 2 in	RF Mode	RF Mode	Scart2 Mode	1	0
R.F In	RF Mode	RF Mode	RF Mode	1	1

Diversity Table A10

Item	Description	21" Stereo	14" Stereo	14" Mono, Headphone	17" Mono, Headphone	21" Mono, Headphone	14" Mono, No-Headphone	20" Mono, No-Headphone	21" Mono, No-Headphone	37TA , 37TB .	51TA , 51TB .	52TA , 52TB .
2801	22uF 50V	X	X									
2802	220nF 25V	X										
2803	4.7uF 10V	X	X									
2804	4.7uF 10V	X	X									
2805	4.7uF 10V	X	X									
2806	10V 2U2											
3801	220R	X	X									
3802	1K	X	X									
3803	100K	X	X									
3804	82K	X	X									
3805	1K	X	X									
3806	100K	X	X									
3807	82K	X	X									
3808	1K	X	X									
3809	150R	X										
4801	Jumper	X	X	X	X	X	X	X	X	X	X	X
4802	Jumper											
4803	Jumper	X	X	X	X	X	X	X	X	X	X	X
4804	Jumper											
4805	Jumper	X	X									
4806	Jumper			X	X	X	X	X	X	X	X	X
4807	Jumper		X	X	X	X						
4808	Jumper											
4809	Jumper											
7801	HEF4052BT	X	X									
7802	HEF4053BT	X										
7803	BC847B	X	X									
7804	BC847B	X	X									
9801	Wire	X	X									
9819	Wire											

2801 B4
2802 F4
2803 D2
2804 C5
2805 E5
3801 A2
3802 A2
3803 C4
3804 C4
3805 D5
3806 D4
3807 E4
3808 E5
3809 H2
4801 C6
4802 C6
4803 E6
4804 E6
4805 E2
4806 F2
4807 H3
4808 H3
4809 C2
7801 C3
7802-A F3
7802-B F3
7802-C G3
7803 C5
7804 D5
9801 F2

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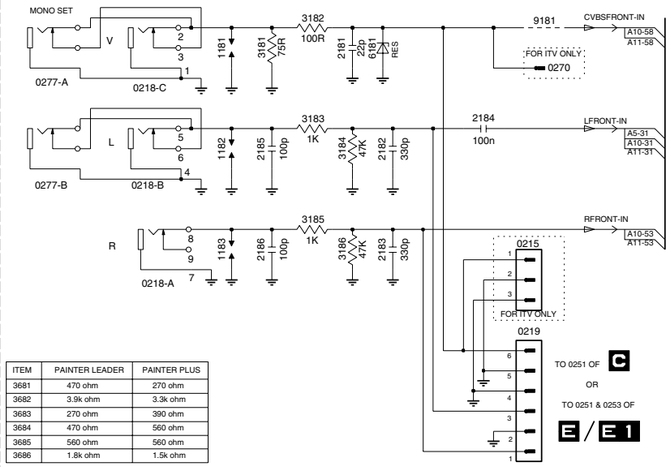
Mono Carrier: Front I/O + Front Control + Headphone

0214 D9 0215 C4 | 0218-A C2 0218-B B2 | 0218-C A2 0219 C4 | 0232 E5 0239 A7 | 0259 D10 0270 A5 | 0277-A A1 0277-B B1 | 0278 D7 0286 E7 | 0292 E4 1181 A2 | 1182 B2 1183 C2 | 1600 B10 1601 A9 | 1602 A9 1603 A8 | 1606 A7 2181 A3 | 2182 B3 2183 C3 | 2184 B4 2185 B3 | 2186 C3 2691 C10 | 2692 C8 2693 E8 | 2694 E8 2695 E8 | 2696 E8 2981 E2 | 2982 F3 2983 F2 | 2984 F3 3181 A3 | 3182 A3 3183 B3 | 3184 B3 3185 B3 | 3186 C3 3681 A9 | 3682 A10 3683 A8 | 3684 A8 3685 A7 | 3686 B9 3691 B8 | 3692 C8 3693 C10 | 3694 C9 3695 C7 | 3981 E3 3982 F3 | 4691 D8 4692 C7 | 4693 C7 4694 G1 | 4695 B8 6181 A3 | 6681 A10 6691 C8 | 6692 D9 9181 A5 | 9982 F2

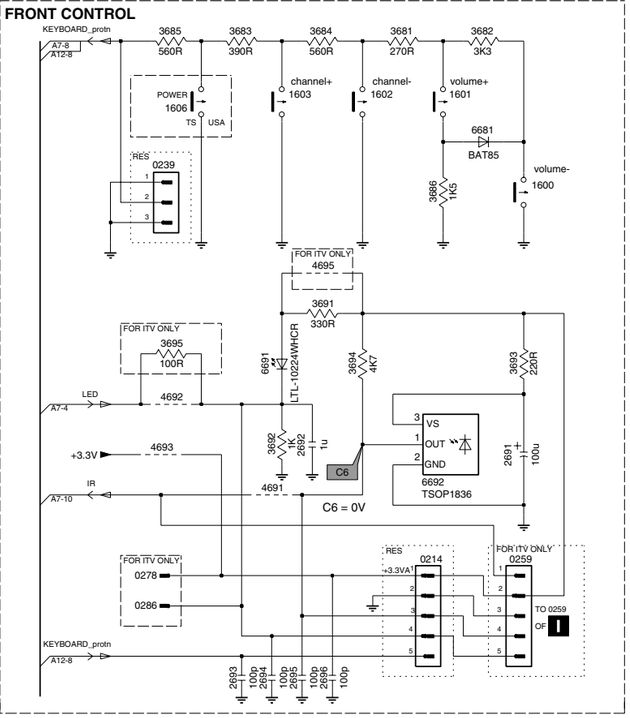
A12 FRONT I/O + FRONT CONTROL + HEADPHONE

FRONT CINCH

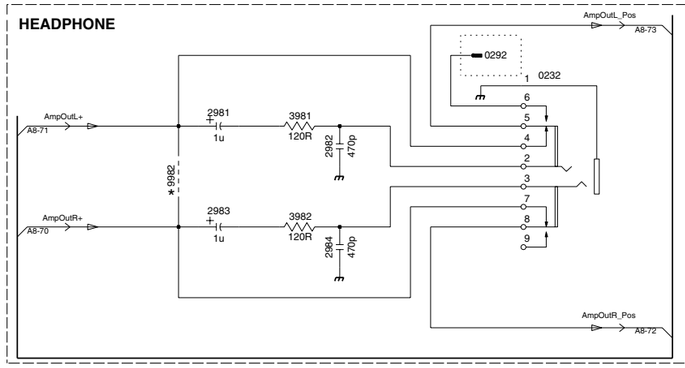


ITEM	PAINTER LEADER	PAINTER PLUS
3681	470 ohm	270 ohm
3682	3.9k ohm	3.3k ohm
3683	270 ohm	390 ohm
3684	470 ohm	560 ohm
3685	560 ohm	560 ohm
3686	1.8k ohm	1.5k ohm

FRONT CONTROL



HEADPHONE



Diversity Table A12

Item	Description	14" Mono, 1&10 page txt, Headphone	17" Mono	21" Mono, 1&10 page txt, no side av	14" Mono, no txt, headphone	21" Mono, no txt, headphone	14" Stereo	21" Stereo, no side av	21" Mono, 10 page txt, side av	21" Stereo, side av	37 Mono, 1page txt	51 Mono, 1page txt	52 Mono, 1page txt, headphone	37 Mono, no txt, headphone	14" Mono, 1page txt, no headphone	20" Mono, 1page txt	21" Mono, 10 page txt, no headphone	52 Mono, 1page txt, no headphone	14" Mono, no txt, no headphone	20" Mono, no txt	21" Mono, no txt	37 Mono, no txt, no headphone	51 Mono, no txt
0215	CON 3P																						
0218	SOC CINCH H 2P F	X	X	X	X	X																	
0218	SOC CINCH H 3P F						X	X															
0219	6P Male								X	X													
0232	SOC PHONE H 1P F	X	X	X	X	X	X	X	X		X	X	X	X									
0259	5P Male																						
1606	SWI TACT																						
2181	22pF 50V	X	X	X	X	X	X	X															
2182	390pF 50V	X	X	X	X	X	X	X															
2183	390pF 50V						X	X															
2184	4.7uF 10V	X	X	X	X	X	X	X	X	X													
2185	390pF 50V	X	X	X	X	X	X	X															
2186	390pF 50V						X	X															
2981	10uF 50V	X	X	X	X	X	X	X	X		X	X	X	X									
2982	470pF 50V	X	X	X	X	X	X	X			X	X	X	X									
2983	10uF 50V	X	X	X	X	X	X	X	X		X	X	X	X									
2984	470pF 50V	X	X	X	X	X	X	X	X		X	X	X	X									
3181	75R	X	X	X	X	X	X	X															
3182	100R	X	X	X	X	X	X	X															
3183	150R	X	X	X	X	X	X	X															
3184	47K	X	X	X	X	X	X	X															
3185	150R						X	X															
3186	47K						X	X															
3681	390R	X	X	X			X	X	X	X	X	X	X		X	X	X	X					
3681	470R				X	X								X					X	X	X	X	X	X
3682	3K3	X	X	X			X	X	X	X	X	X	X		X	X	X	X					
3682	3K9				X	X								X					X	X	X	X	X	X
3683	270R				X	X								X					X	X	X	X	X	X
3683	390R	X	X	X			X	X	X	X	X	X	X		X	X	X	X					
3684	470R				X	X								X					X	X	X	X	X	X
3684	560R	X	X	X			X	X	X	X	X	X	X		X	X	X	X					
3686	1K5	X	X	X			X	X	X	X	X	X	X		X	X	X	X					
3686	1K8				X	X								X					X	X	X	X	X	X
3692	1K	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3695	330R																								
3981	120R	X	X	X	X	X	X	X		X	X	X	X												
3982	120R	X	X	X	X	X	X	X		X	X	X	X												
4692	Jumper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4693	Jumper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9181	Wire	X	X	X	X	X	X	X	X																
9982	Wire	X	X	X	X	X			X		X	X	X	X											

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Mono Carrier: Rear I/O SCART

A14 REAR I/O SCART

SCART 1 — 0235-A

Audio-R_out	1A	
Audio-R_in	2A	
Audio-L_out	3A	
	4A	
	5A	
Audio-L_in	6A	
RGB-B_in	7A	
Function_Sw	8A	
	9A	
	10A	
RGB-G_in	11A	
	12A	
	13A	
	14A	
RGB-R_in	15A	
RGB-BL_in	16A	
	17A	
	18A	
	19A	
Terr_CVBS_out	20A	
Video_in	21A	

SCART 2 — 0235-B

	1B	Audio-R_out
	2B	Audio-R_in
	3B	Audio-L_out
	4B	
	5B	
	6B	Audio-L_in
	7B	
	8B	Function_Sw
	9B	
	10B	
	11B	
	12B	
	13B	
	14B	
	15B	YC-C_in
	16B	
	17B	
	18B	
	19B	CVBS_out
	20B	Video/YC-Y_in
	21B	

TO 0227 0F — FOR ITV ONLY — 0236

TO 0227 0F — FOR ITV ONLY — 0227

+8V

R1-OUT A10-57 — R2-OUT A10-63
R1-IN A10-54 — R2-IN A10-55
L1-OUT A10-56 — L2-OUT A10-62
L1-IN A5-32 / A10-32 — L2-IN A10-52
B_U-IN A5-34 — STATUS2 A7-2
STATUS1 A7-1 — C-IN A5-30
G_Y-IN A5-33
V_OUT A5-40
R_V-IN A5-35 — Y_CVBS-IN A10-59
FBL-1 A5-39
V1-OUT A5-41 — R-OUT A10-61
CVBS1-IN A5-38 — L-OUT A10-60
ITV_MSG A7-75

7131 BC847B (2V9 / 3V5 / 7V6)
7101 BC847B (2V9 / 3V5 / 7V6)

0229 — FOR ITV ONLY — TO 0242 OF
0242 — TO 0242 OF — FOR ITV ONLY
0262 — FOR ITV ONLY — TO 0262 OF

MONITOR OUTPUT
- 1 — Audio-RIGHT — 4 — 0224-A
- 2 — Audio-LEFT — 5 — 0224-B

Diversity Table A14

Item	Description	Mono sets	21* Stereo
0235	SOC EURO H 21P F	X	
0235	21P Female	X	
0235	42P F		X
0235	42P Female		X
0236	3P Male		
2109	4U7 10V	X	X
2139	4.7uF 10V		X
2140	390pF 50V		X
2142	4.7uF 10V		X
2143	330pF 50V		X
2144	330pF 50V		X
2145	22pF 50V		X
2147	22pF 50V		X
2152	100n		
2154	100n		
3139	27K		X
3140	6K8		X
3140	6K8	X	
3142	100R		X
3143	68R		X
3144	1K		X
3145	150R		X
3146	10R		X
4101	Jumper	X	
4102	Jumper	X	
4103	Jumper		
4104	Jumper		
4105	Jumper		
4151	Jumper		
4152	Jumper		
7131	BC847B		X

Diversity Table A14

Item	Description	1 SCART, In-cinch front, Headphone front	2 SCART, Side AV, MONO cinch	1 SCART, Headphone front	1 SCART	1 SCART, Side AV, Headphone (side), stereo cinch
2103	4.7uF 10V	X				

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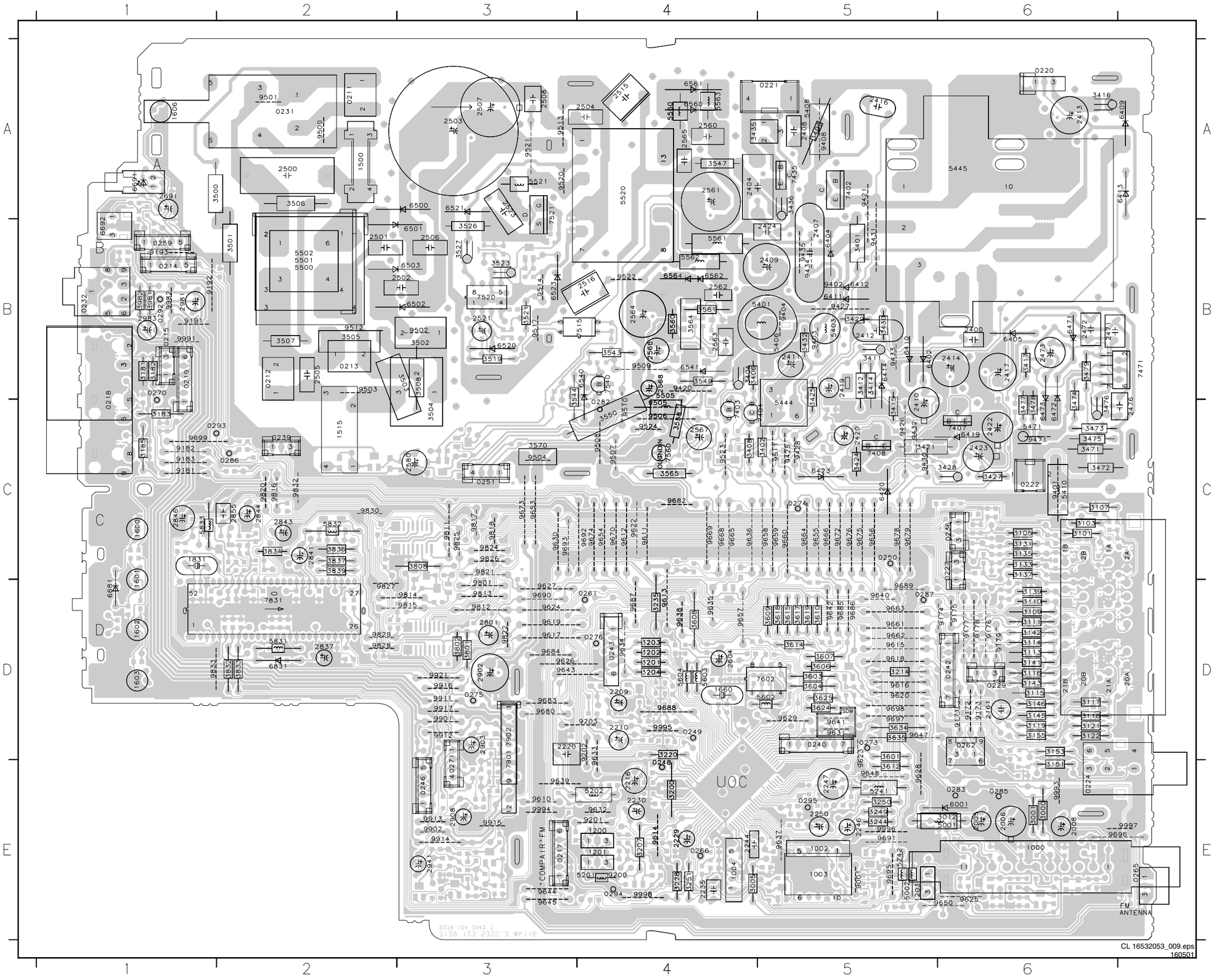
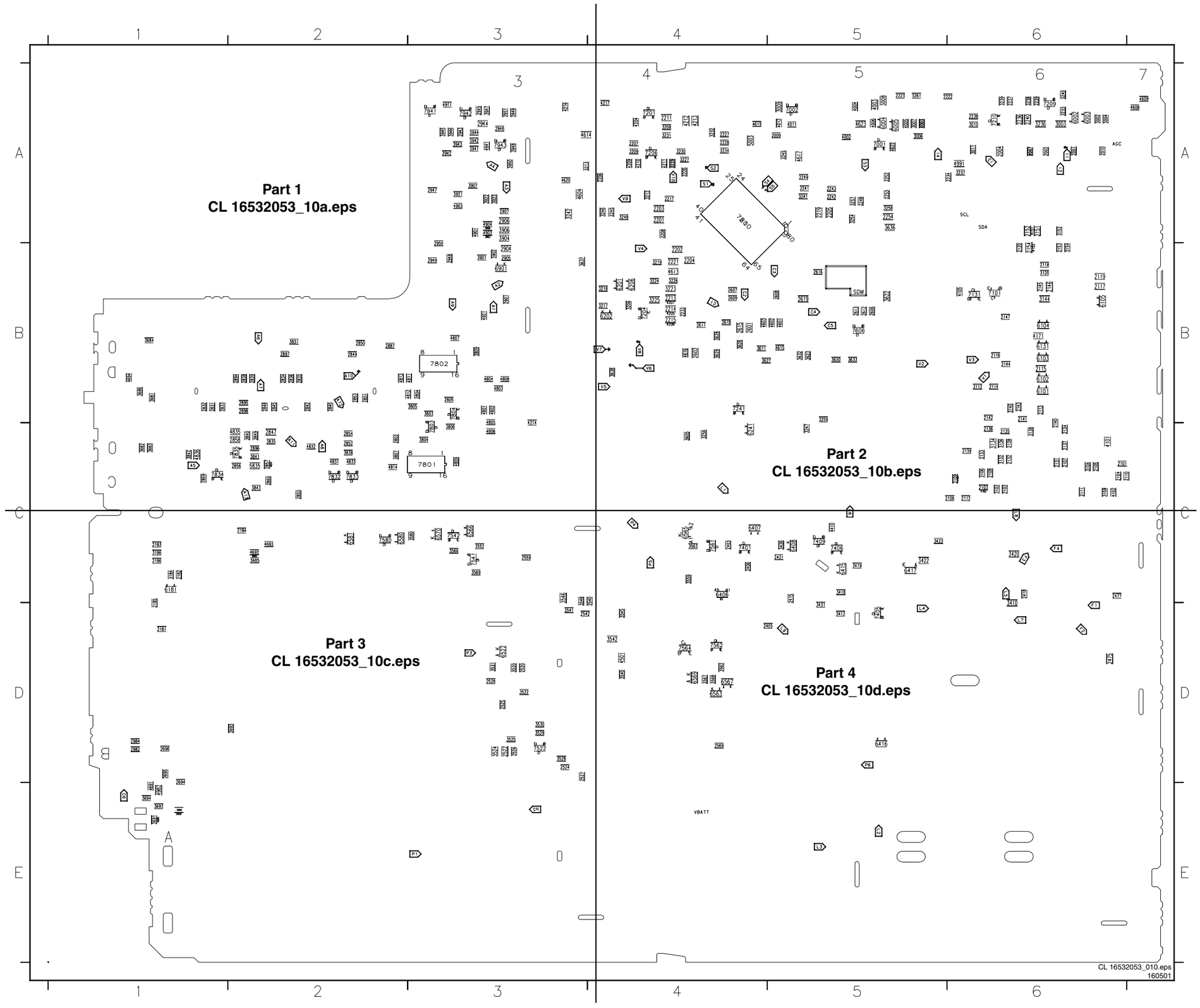
0224-A F11
0224-B F11
0227 A7
0229 E7
0235-A A1
0235-B A11
0236 A5
0242 F6
0262 G5
1101 A3
1102 B3
1103 B3
1104 C3
1105 C3
1106 D3
1107 C2
1108 D3
1109 C2
1110 E3
1111 E3
1112 F3
1113 F3
1131 A9
1132 B9
1133 B9
1134 C9
1135 B10
1136 C9
1137 C10
1138 C10
1139 D9
1140 C10
1141 D9
1142 E9
1151 F9
1152 F9
2101 A3
2102 A4
2103 A5
2104 B3
2105 B4
2106 B5
2107 B3
2108 B4
2109 B5
2110 C3
2111 C4
2112 C5
2113 C5
2114 D5
2115 D5
2116 E5
2117 E5
2118 F4
2119 F3
2120 F4
2131 A9
2132 A8
2133 A7
2134 B9
2135 B8
2136 B7
2137 B9
2138 B8
2139 B7
2140 C9
2141 C8
2142 C7
2143 C8
2144 D7
2145 D8
2146 E9
2147 E8
2151 F9
2152 E8
2153 F9
2154 F8
2161 G3
3101 A4
3102 A4
3103 B4
3104 B4
3105 B4
3106 B4
3107 C4
3108 C4
3109 C4
3110 C5
3111 D4
3112 D4
3113 D4
3114 D5
3115 E4
3116 E5
3117 E4
3118 E5
3119 F3
3120 F4
3121 F3
3122 F4
3131 A9
3132 A8
3133 B9
3134 B8
3135 B9
3136 B8
3137 C9
3138 C8
3139 C9
3140 C8
3141 D8
3142 D7
3143 D9
3144 D8
3145 E9
3146 E8
3151 E9
3152 F8
3153 F9
3154 F8
3155 G3
4101 A3
4102 B3
4103 A5
4104 B5
4105 E6
4151 E8
4152 F8
6101 C3
6102 D3
6103 D3
6104 E3
6105 E3
6131 D8
7101 E5
7131 D7

Layout Mono Carrier (Top View)



0211 A2 2903 D3 3832 D2 9508 C4
0212 B2 2908 E3 3833 D2 9509 B4
0213 B2 2941 E3 3834 C2 9510 C4
0214 B1 2981 B1 3836 C2 9511 C5
0215 B1 2983 B1 3837 C2 9512 B2
0217 E3 3000 E6 3839 C2 9513 A3
0218 C1 3001 E6 3981 B1 9514 B3
0219 B1 3005 E4 3982 B1 9517 B3
0220 A6 3012 E6 5001 E6 9520 A3
0221 A5 3101 C6 5002 E5 9521 A3
0222 C6 3103 C6 5201 E4 9522 B4
0224 E6 3105 C6 5202 E4 9523 C4
0227 C6 3107 C6 5241 E5 9524 C4
0229 D6 3109 D6 5242 E5 9610 E3
0231 A2 3110 D6 5401 B5 9611 C4
0232 B1 3111 D6 5403 B5 9612 C4
0235 D6 3113 D6 5406 B5 9613 D4
0236 C6 3114 D6 5408 A5 9614 E4
0239 C2 3115 D6 5410 C6 9615 D5
0240 D5 3116 D6 5444 C5 9616 D5
0242 D6 3117 D6 5445 A6 9617 D3
0243 D4 3118 D6 5471 C6 9618 D5
0246 E3 3119 D6 5500 B2 9619 D3
0248 E4 3121 D6 5501 B2 9620 D5
0249 D4 3122 D6 5502 B2 9622 C4
0250 C5 3131 C6 5505 B4 9623 D5
0251 C3 3133 C6 5520 A4 9624 D3
0259 B1 3135 C6 5521 A3 9625 E6
0261 D4 3137 C6 5560 A4 9626 D3
0262 D6 3139 D6 5561 B4 9627 D3
0265 E7 3141 D6 5562 B4 9628 E5
0266 E4 3142 D6 5563 A4 9629 D5
0270 B1 3143 D6 5602 D5 9630 C3
0271 E3 3145 D6 5603 D4 9631 D5
0273 D5 3146 D6 5604 D4 9632 E4
0274 C5 3151 E6 5831 D2 9633 D4
0275 D3 3153 D6 5832 C2 9634 D4
0276 D4 3155 D6 5833 C1 9635 D4
0277 B1 3181 B1 6001 E6 9636 C4
0282 C4 3182 B1 6402 B5 9637 E5
0283 E6 3183 C1 6404 B5 9638 D4
0285 E6 3185 C1 6405 B6 9639 E3
0286 C2 3200 E4 6409 A7 9640 D5
0287 D5 3201 D4 6410 B5 9641 D5
0292 B1 3202 D4 6411 B5 9642 D5
0293 C1 3203 D4 6412 B5 9643 D3
0294 E4 3204 D4 6413 A7 9644 E3
0295 E5 3207 E4 6414 B5 9645 E3
1000 E6 3214 D5 6419 C6 9647 D5
1002 E5 3220 D4 6420 C5 9648 E5
1003 E5 3228 E4 6423 C5 9650 E6
1004 E4 3235 D4 6471 B6 9653 C3
1200 E4 3244 E5 6472 C6 9654 C4
1201 E4 3249 E5 6473 C6 9655 C5
1203 E5 3250 E5 6500 A3 9656 C5
1500 A2 3251 E4 6501 B3 9657 D4
1515 C2 3401 B5 6502 B3 9658 C5
1600 C1 3402 C5 6503 B3 9659 C5
1601 C1 3403 A5 6520 B3 9660 C5
1602 D1 3404 B4 6521 A3 9661 D5
1603 D1 3406 B4 6523 B3 9662 D5
1606 A1 3408 C4 6540 B4 9663 D5
1660 D4 3411 B5 6541 B4 9664 C5
1831 C1 3412 B5 6560 A4 9665 C5
2005 E6 3414 B5 6561 A4 9666 C5
2006 E6 3415 C5 6562 B4 9668 C4
2008 E6 3416 A6 6564 B4 9669 C4
2161 D6 3417 B6 6681 D1 9670 C4
2209 D4 3421 C5 6691 A1 9672 C5
2210 D4 3424 C5 6692 B1 9673 C3
2216 E4 3425 B5 6831 D2 9674 C4
2220 D3 3427 C6 7402 A5 9675 C5
2229 E4 3428 C6 7403 C4 9676 C5
2230 E4 3429 B5 7404 C5 9678 C5
2235 E4 3430 B5 7407 C6 9679 C5
2244 E4 3432 B5 7408 C5 9680 D3
2246 E5 3435 A4 7435 A5 9682 C4
2247 E5 3436 A5 7471 B7 9683 D3
2250 E5 3471 C6 7515 B4 9684 D3
2400 B6 3472 C6 7520 B3 9685 D5
2404 A4 3473 C6 7521 A3 9686 D5
2407 B5 3474 C6 7540 B4 9687 D4
2408 A5 3475 C6 7560 C4 9688 D4
2409 B5 3476 C6 7602 D5 9689 D5
2410 C5 3477 C6 7831 D2 9690 D3
2411 B5 3478 C6 7901 D3 9691 E5
2412 B5 3479 B6 7902 D3 9692 C4
2413 A6 3500 A1 9001 E5 9693 C3
2414 B6 3501 B2 9171 D6 9695 E5
2416 A5 3502 B3 9172 D6 9696 E6
2417 B6 3503 B3 9173 D6 9697 D5
2419 B5 3504 C3 9174 D6 9698 D5
2420 C5 3505 B2 9175 D6 9699 C1
2422 C6 3506 A2 9176 D6 9801 D3
2423 C6 3507 B2 9177 D6 9811 C3
2424 B5 3508 B3 9178 D6 9812 D3
2471 B6 3519 B3 9179 D6 9813 D3
2472 B6 3521 B3 9181 C1 9814 D3
2473 B6 3523 B3 9182 C1 9815 D3
2476 C7 3526 B3 9183 C1 9816 C2
2500 A2 3527 B3 9191 B1 9817 C3
2501 B2 3543 B4 9192 B1 9818 C3
2502 B3 3544 B3 9193 B1 9820 C2
2503 A3 3547 A4 9200 E4 9821 C3
2504 A4 3549 B4 9201 E4 9822 D3
2505 B2 3550 C4 9202 D4 9824 C3
2506 B3 3558 C4 9203 D4 9825 C3
2507 A3 3560 B4 9401 C6 9826 C3
2508 A3 3561 B4 9402 B5 9827 D2
2515 A4 3564 B4 9403 B5 9828 D2
2516 B4 3565 C4 9404 B5 9829 D2
2521 B3 3570 C3 9408 A5 9830 C2
2523 A3 3601 D5 9420 B4 9832 C2
2560 A4 3603 D5 9421 A5 9833 D1
2561 A4 3604 D5 9425 C5 9901 D3
2562 B4 3606 D5 9426 C5 9902 E3
2563 B4 3607 D5 9427 B5 9911 D3
2564 B4 3608 D4 9428 C5 9912 D3
2565 A4 3609 D5 9430 C5 9913 E3
2566 B4 3610 D5 9431 B5 9914 E3
2567 C4 3612 E5 9432 C5 9915 E3
2568 B4 3614 D5 9433 B5 9916 D3
2580 C3 3615 D5 9434 B5 9917 D3
2604 D4 3617 D5 9435 B5 9921 D3
2691 A1 3618 D5 9471 C6 9982 B1
2801 D3 3619 D5 9500 A2 9991 B1
2837 D2 3624 D5 9501 A2 9993 E6
2841 C2 3625 D5 9502 B3 9994 E3
2843 C2 3634 D5 9503 B2 9995 D4
2844 C2 3635 D5 9504 C3 9996 E5
2846 C1 3801 D3 9505 C4 9997 E7
2855 C2 3802 D3 9506 C4 9998 E4
2902 D3 3808 C3 9507 C4 09m.eps
300501

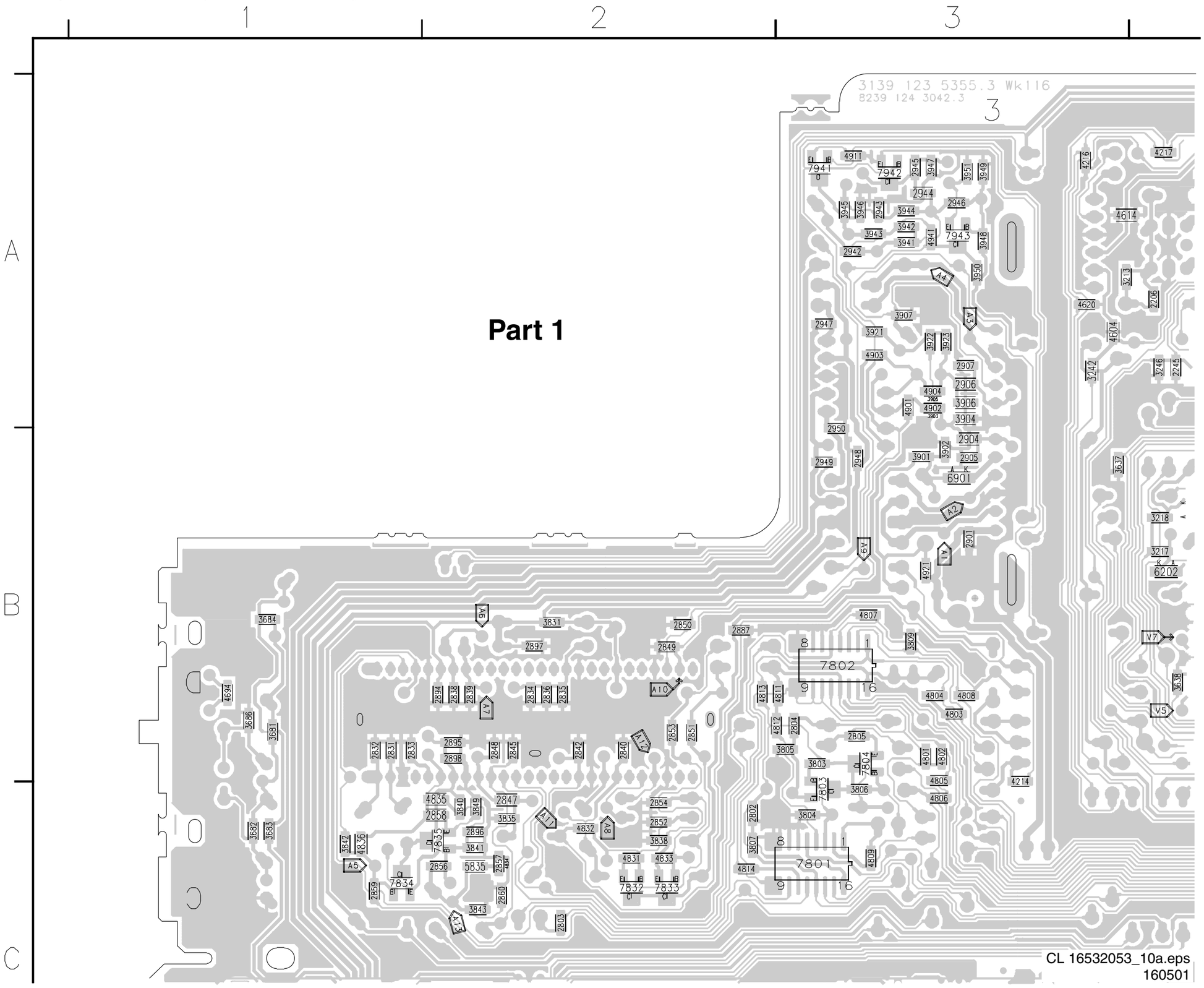
Layout Mono Carrier (Overview Bottom View)



2001 A6 2602 B4 3236 A6 4003 A5 7002 A5
2002 A6 2606 B5 3237 A6 4004 A5 7101 B6
2003 A5 2607 B4 3238 A6 4005 A5 7131 B6
2004 A6 2608 B5 3239 A6 4006 A5 7200 A4
2007 A6 2609 B4 3240 A6 4007 A6 7201 A4
2009 A5 2611 B4 3241 A5 4011 A5 7204 B4
2010 A6 2612 B5 3242 A3 4012 A5 7206 A4
2101 C6 2613 B5 3245 A5 4101 C6 7209 A6
2102 C6 2615 B4 3246 A4 4102 C6 7210 A6
2103 C6 2616 B5 3247 C5 4103 C6 7241 B4
2104 C6 2618 B4 3248 A4 4104 C6 7401 C4
2105 C6 2619 B5 3254 A5 4105 B6 7405 D5
2106 C6 2692 E1 3256 C4 4151 A6 7406 C5
2107 C6 2693 D2 3257 A5 4152 B6 7409 C5
2108 C6 2694 D1 3258 A5 4171 B6 7522 D3
2109 C6 2695 D1 3259 B5 4204 A4 7541 C3
2110 C6 2696 D1 3261 A5 4205 B4 7542 C3
2111 C6 2802 C2 3410 D6 4206 B4 7561 C4
2112 C6 2803 C2 3413 D5 4207 B4 7562 D4
2113 B6 2804 B3 3418 C5 4209 A4 7564 D4
2114 B6 2805 B3 3419 C5 4210 A4 7580 C2
2115 B6 2831 B1 3420 C6 4211 A4 7606 B5
2116 B6 2832 B1 3422 C5 4212 A4 7801 C3
2117 B6 2833 B1 3423 C5 4213 A4 7802 B3
2118 B6 2834 B2 3426 C5 4214 B3 7803 C3
2119 B6 2835 B2 3431 D5 4216 A3 7804 B3
2120 B6 2836 B2 3520 D3 4217 A4 7832 C2
2131 C6 2838 B2 3522 D3 4410 C5 7833 C2
2132 C6 2839 B2 3524 D3 4501 D4 7834 C1
2133 C6 2840 B2 3525 D3 4601 B5 7835 C2
2134 C6 2842 B2 3528 D3 4602 B5 7941 A3
2135 C6 2845 B2 3529 D3 4603 B4 7942 A3
2136 C6 2847 C2 3530 D3 4604 A3 7943 A3
2137 C6 2848 B2 3531 D3 4608 A7
2138 C6 2849 B2 3540 D4 4609 A7
2139 C6 2850 B2 3541 D3 4613 B4
2140 C6 2851 B2 3542 D4 4614 A3
2141 B6 2852 C2 3545 D4 4615 B5
2142 B6 2853 B2 3546 C3 4616 B4
2143 B6 2854 C2 3548 C3 4617 A5
2144 B6 2856 C2 3552 C3 4619 A4
2145 B6 2857 C2 3559 C4 4620 A3
2146 B6 2858 C2 3562 D4 4622 A5
2147 B6 2859 C1 3563 C4 4623 A5
2151 A6 2860 C2 3566 C3 4691 E1
2152 A6 2887 B2 3567 D4 4692 C2
2153 B6 2894 B2 3568 D4 4693 C2
2154 B6 2895 B2 3569 C3 4694 B1
2181 D1 2896 C2 3580 C3 4695 E1
2182 C1 2897 B2 3605 C4 4801 B3
2183 C1 2898 B2 3611 B4 4802 B3
2184 C2 2901 B3 3622 B5 4803 B3
2185 D1 2904 B3 3623 B5 4804 B3
2186 C1 2905 B3 3626 B4 4805 B3
2201 A4 2906 A3 3627 B4 4806 C3
2202 B4 2907 A3 3628 B4 4807 B3
2203 A4 2942 A3 3629 B4 4808 B3
2204 B4 2943 A3 3630 B5 4809 C3
2205 A5 2944 A3 3632 B5 4811 B3
2206 A4 2945 A3 3633 B5 4812 B3
2207 A4 2946 A3 3636 A5 4813 B2
2208 A4 2947 A3 3637 B3 4814 C2
2211 A4 2948 B3 3638 B4 4831 C2
2213 B4 2949 B3 3681 B1 4832 C2
2214 B4 2950 B3 3682 C1 4833 C2
2215 B4 2982 D1 3683 C1 4834 C2
2217 A4 2984 D1 3684 B1 4835 C2
2219 A5 3002 A6 3685 C2 4836 C1
2221 B4 3003 A6 3686 B1 4901 A3
2222 A6 3004 A6 3691 E1 4902 A3
2223 A5 3006 A5 3692 E1 4903 A3
2225 A4 3007 A5 3693 E1 4904 A3
2226 A4 3008 A5 3694 E1 4911 A3
2227 A4 3009 A5 3695 C2 4921 B3
2228 A4 3010 A6 3803 B3 4941 A3
2233 B4 3011 A6 3804 C3 4982 E1
2234 A6 3102 C6 3805 B3 4991 A6
2236 A6 3104 C6 3806 C3 5003 A4
2237 A6 3106 C6 3807 C2 5835 C2
2238 A6 3108 C6 3809 B3 6002 A6
2239 A6 3112 B6 3831 B2 6003 A6
2240 A6 3120 B6 3835 C2 6004 A5
2241 A5 3132 C6 3838 C2 6005 A5
2242 A5 3134 C6 3840 C2 6101 B6
2243 A5 3136 C6 3841 C2 6102 B6
2245 A4 3138 C6 3842 C1 6103 B6
2248 A5 3140 B6 3843 C2 6104 B6
2249 A5 3144 B6 3849 C2 6105 B6
2252 A5 3152 A6 3901 B3 6131 B6
2253 A5 3154 B6 3902 B3 6181 C1
2254 A5 3184 C1 3903 A3 6201 B4
2403 C4 3186 C1 3904 A3 6202 B4
2405 D5 3206 B4 3905 A3 6206 B4
2406 C4 3208 A4 3906 A3 6241 C4
2415 C5 3209 A4 3907 A3 6406 C4
2418 C6 3212 A4 3921 A3 6407 C4
2421 C5 3213 A3 3922 A3 6408 C5
2475 D6 3217 B4 3923 A3 6415 C5
2477 C6 3218 B4 3941 A3 6416 D5
2520 D3 3219 B4 3942 A3 6417 C5
2522 D3 3223 B4 3943 A3 6522 D3
2524 D3 3224 B4 3944 A3 6563 D4
2525 D3 3225 B4 3945 A3 6565 C4
2526 D3 3226 B4 3946 A3 6566 C3
2527 D3 3227 A4 3947 A3 6567 D4
2528 D3 3229 A4 3948 A3 6569 D4
2540 C4 3230 A4 3949 A3 6570 C3
2542 D3 3231 A4 3950 A3 6580 C2
2559 C3 3232 A4 3951 A3 6581 C2
2569 D4 3233 A6 4001 A5 6901 B3
2601 B4 3234 A4 4002 A5 7001 A5

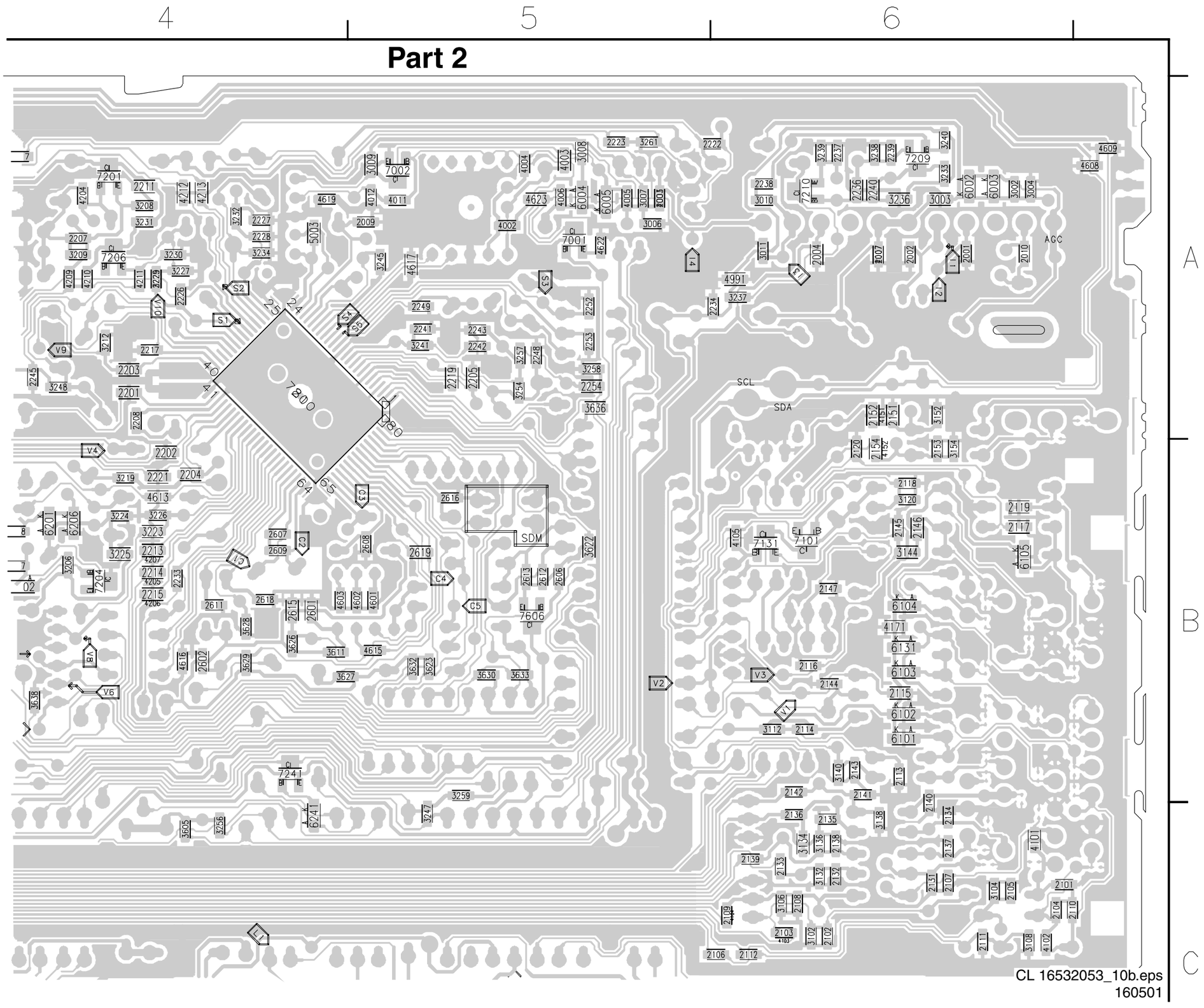
Layout Mono Carrier (Part 1 Bottom View)

Part 1

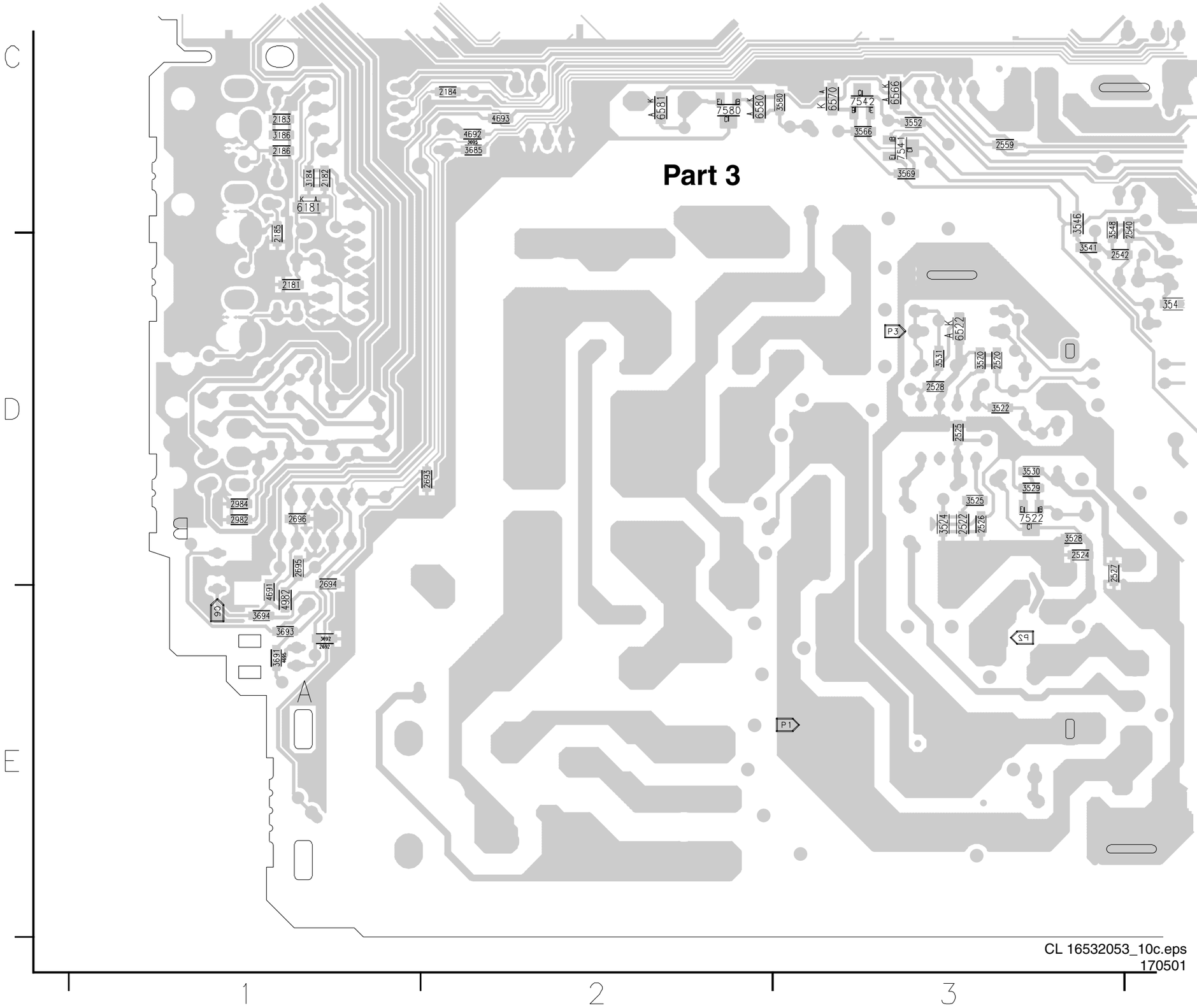


CL 16532053_10a.eps
160501

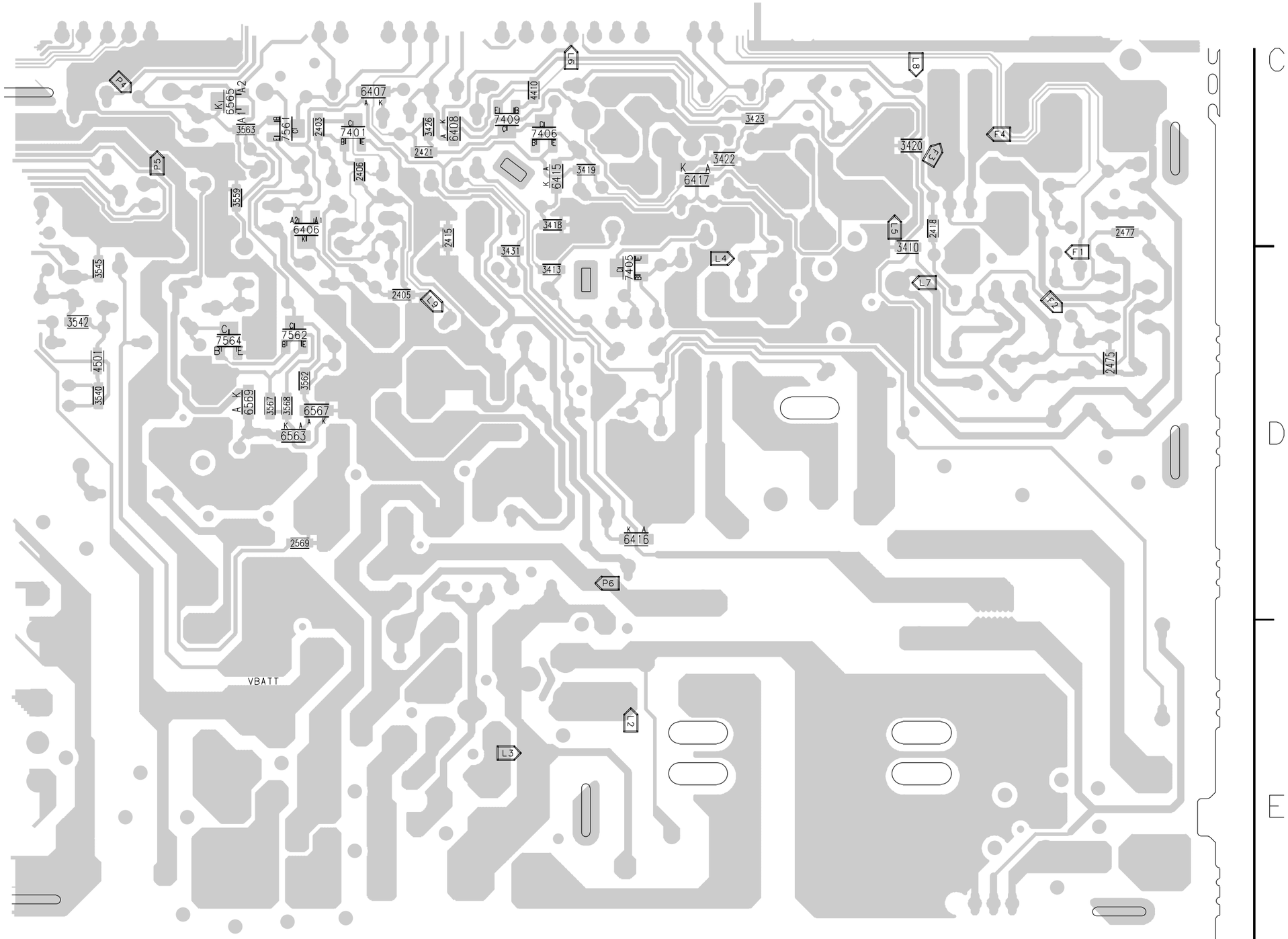
Layout Mono Carrier (Part 2 Bottom View)



Layout Mono Carrier (Part 3 Bottom View)



Layout Mono Carrier (Part 4 Bottom View)



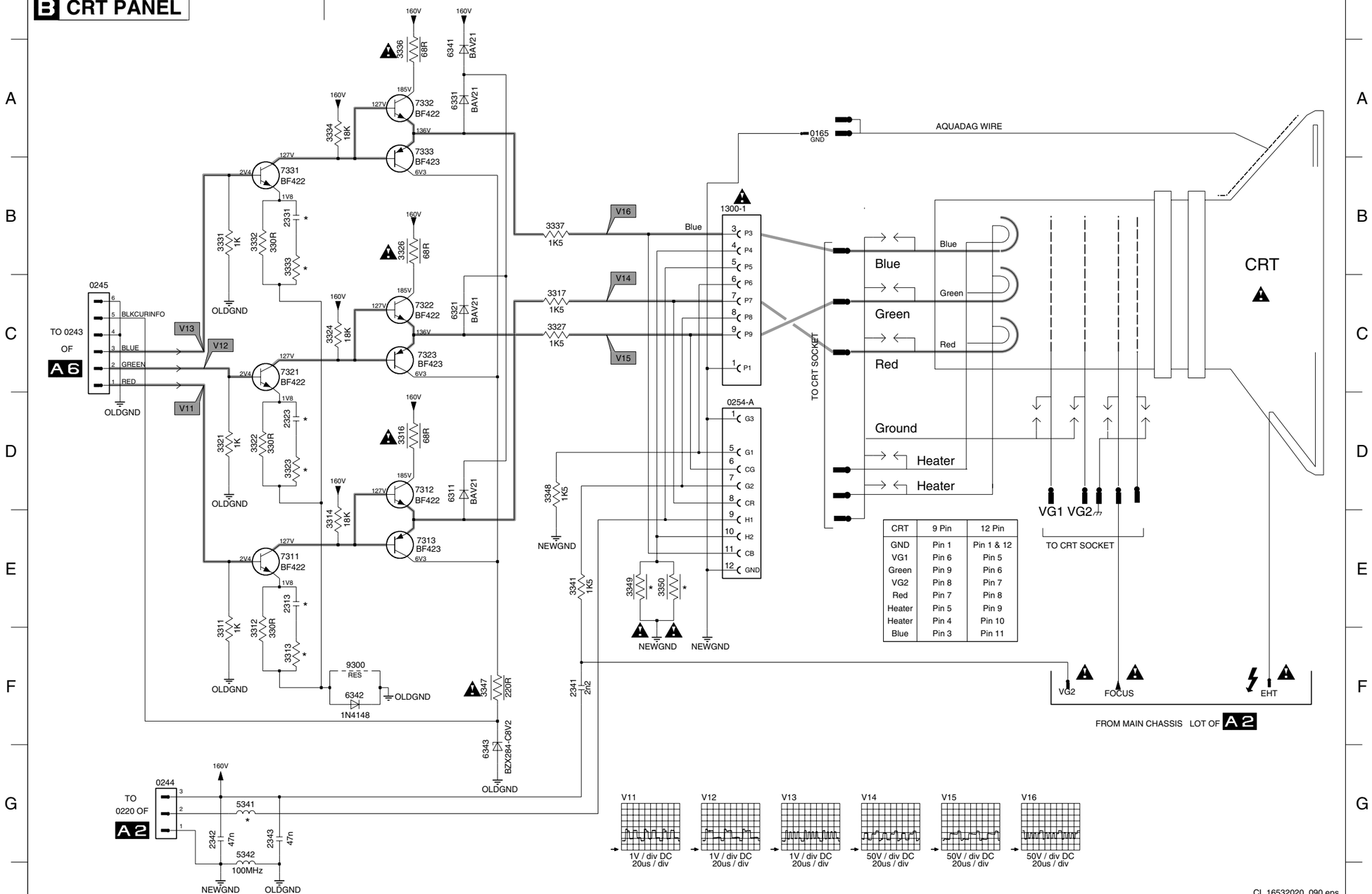
Part 4

CL 16532053_10d.eps
170501

CRT Panel

VG2 F9 0165 A7 | 0244 G2 0245 C1 | 0254-A D7 1300-1 B7 | 2313 E3 2323 D3 | 2331 B3 2341 F5 | 2342 G2 2343 G2 | 3311 F2 3312 F2 | 3313 F3 3314 E3 | 3316 D4 3317 C5 | 3321 D2 3322 D2 | 3323 D3 3324 C3 | 3326 B4 3327 C5 | 3331 B2 3332 B2 | 3333 B3 3334 A3 | 3336 A4 3337 B5 | 3341 E5 3347 F4 | 3348 D5 3349 E6 | 3350 E6 5341 G2 | 5342 G2 6311 D4 | 6321 C4 6331 A4 | 6341 A4 6342 F3 | 6343 G4 7311 E3 | 7312 D4 7313 E4 | 7321 C3 7322 C4 | 7323 C4 7331 B3 | 7332 A4 7333 A4 | 9300 F3

B CRT PANEL



CRT	9 Pin	12 Pin
GND	Pin 1	Pin 1 & 12
VG1	Pin 6	Pin 5
Green	Pin 9	Pin 6
VG2	Pin 8	Pin 7
Red	Pin 7	Pin 8
Heater	Pin 5	Pin 9
Heater	Pin 4	Pin 10
Blue	Pin 3	Pin 11

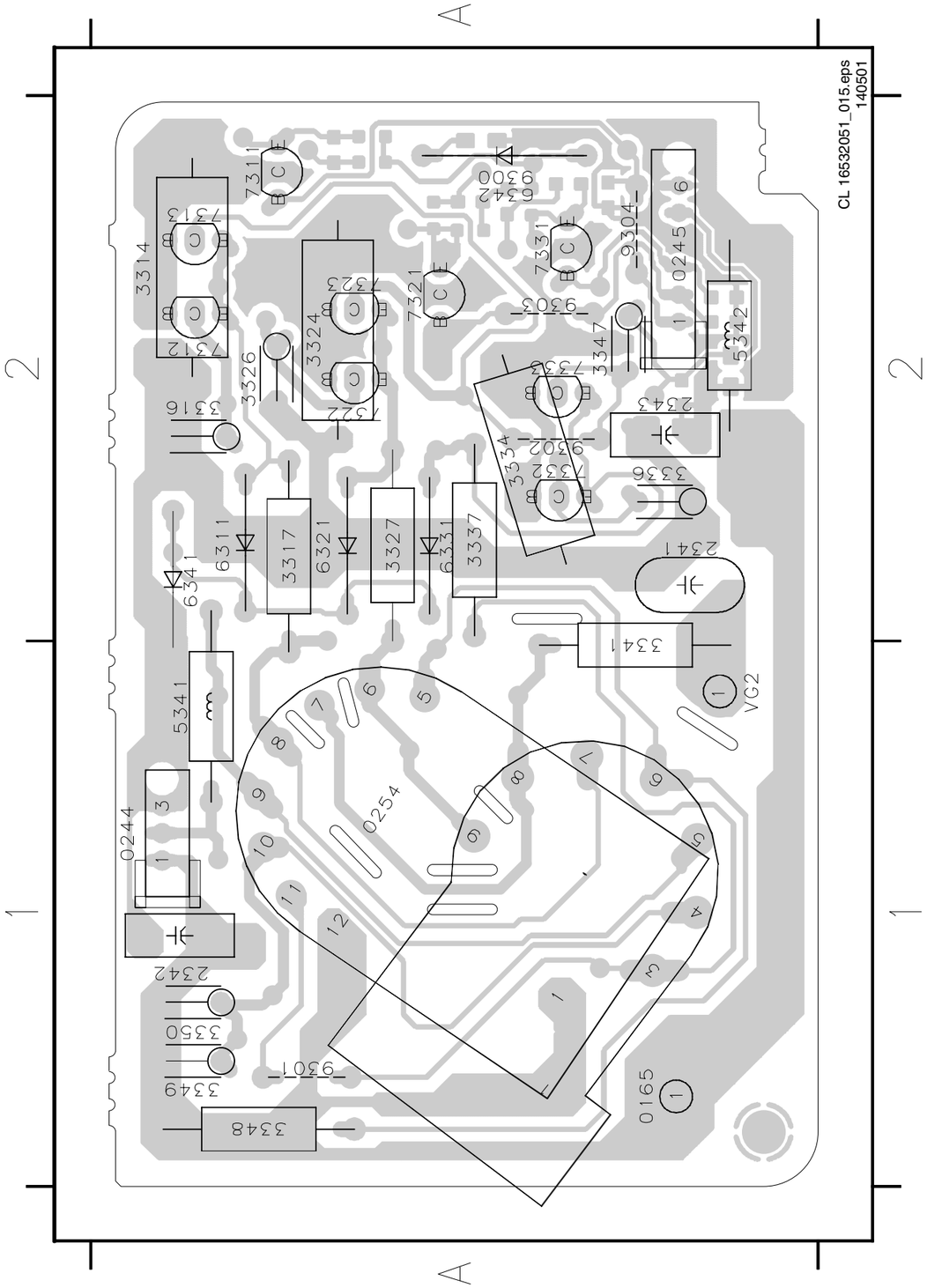
CL 16532020_090.eps
050601

Diversity Table B

Item	Description	14"	17"	20"	21" Stereo, CRT A51EER133X72	21" Mono	21" Stereo
0254	9P F CRT N-NECK			X	X	X	X
0254	9P F CRT M-NECK	X	X				
2313	270P 50V	X	X				
2313	220P 50V			X	X	X	X
2323	50V 390P	X	X	X	X	X	X
2331	50V 390P	X	X	X	X	X	X
3313	10R	X	X	X	X	X	X
3323	10R	X	X	X	X	X	X
3333	10R	X	X	X	X	X	X
3349	1R			X			
3349	1R5	X	X		X		
3349	1R8					X	X
3350	1R			X			
3350	1R5	X	X		X		
3350	1R8					X	X
5341	4U7	X					
5341	22U				X		
5341	1U			X			
5341	15U					X	X
5341	12U		X				

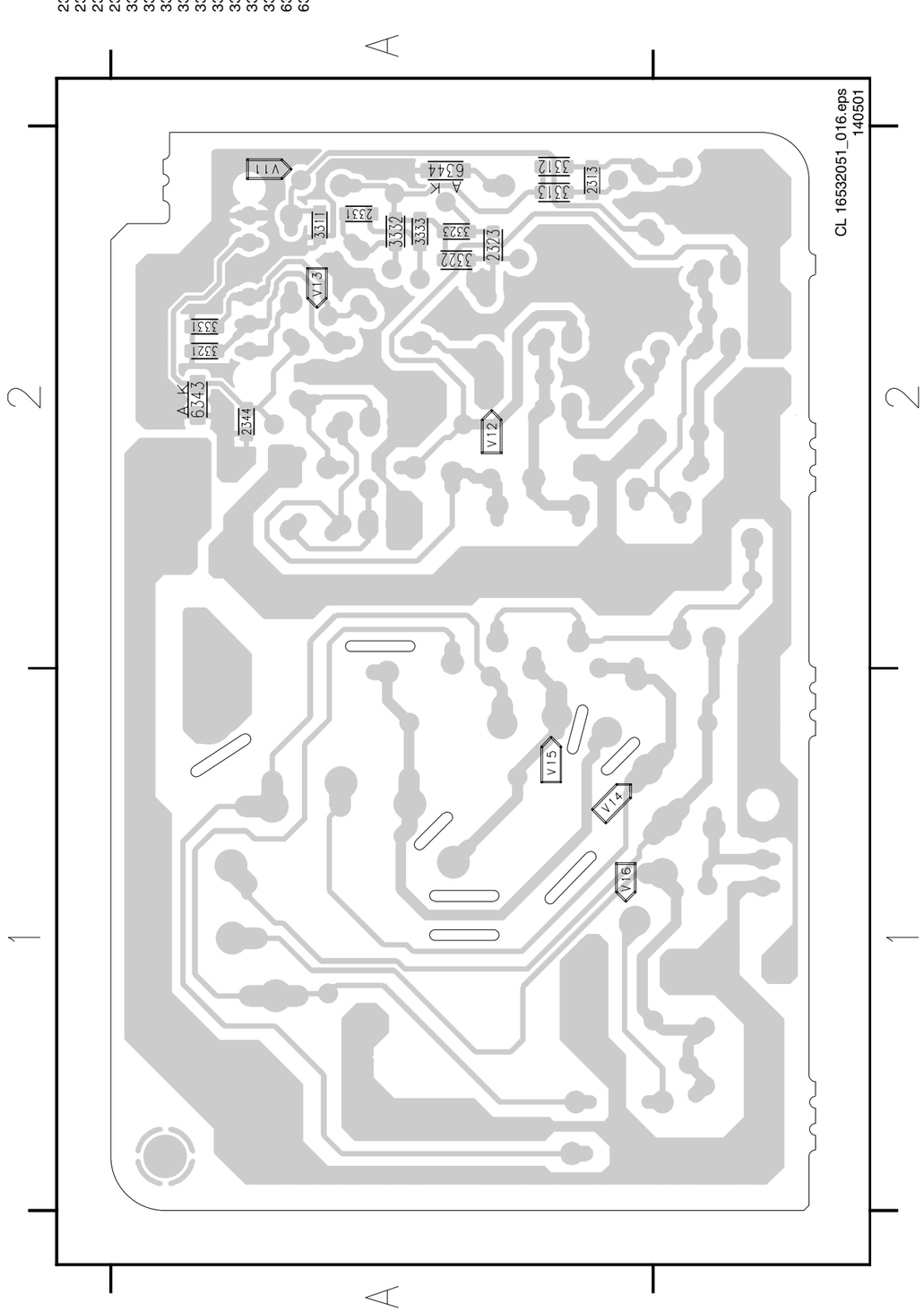
Layout CRT Panel (Top View)

VG2 A1
0165 A1
0244 A1
0245 A2
0254 A1
1300 A1
2341 A2
2342 A1
2343 A2
3314 A2
3316 A2
3317 A2
3324 A2
3326 A2
3327 A2
3334 A2
3336 A2
3337 A2
3341 A1
3347 A2
3348 A1
3349 A1
3350 A1
5341 A1
5342 A2
6311 A2
6321 A2
6331 A2
6341 A2
7311 A2
7312 A2
7313 A2
7321 A2
7322 A2
7323 A2
7331 A2
7332 A2
7333 A2
9300 A2
9301 A1
9302 A2
9303 A2
9304 A2



Layout CRT Panel (Bottom View)

2313 A2
2323 A2
2331 A2
2344 A2
3311 A2
3312 A2
3313 A2
3321 A2
3322 A2
3323 A2
3331 A2
3332 A2
3333 A2
6343 A2
6344 A2



EPS 4 (External Power Supply)

EPS 4 (External Power Supply)

F

To 0211 A1 (Power Supply)

0211 CON1 (L 1, N 2)

0213 CON2 (L 1, N 2)

1A/250V F1

UU9.8 22MH L2

UU9.8 22MH L1

C1 0.1UF/275VAC

C12 0.01UF/1KV

R4 1.5M(1/2W)

BR1 1A 600V

R2 7.5M

R1

* ZD2 for EPS4B

* ZD2 5W 400V

C5 33UF/450V

DC+

T1 EE16

43R R23 0.001UF/1KV C24

CR3 3A 100V

CR4 3A 100V

C11 330UF/25V

0.001UF/1KV

R27 43R C25

CR1 5A 40V

CR2 5A 40V

680UF/10V C7

0.001UF/1KV

R28 43R C26

D3 10A 30V

470UF/10V C27

R29 560R

R13 510R

IC4 KA278R12

C35 470UF/25V

IC5 KA278R05

C23 470UF/10V

C38 470UF/10V

DR6*8 16UH L9

C36 0.1UF/50V

R26 100R(1/4W)

RH-3.5*0.8*9 L8

L7 RH-3.5*0.8*9

L10 RH-3.5*0.8*9

D4 1A 100V

D5 1A 100V

C39 220UF/10V

CON3 0228

5 +3.3V
4 Gnd
3 +12V
2 Gnd
1 +5V

To 0228 J (Interface)

G1

G

To Ground Pin 0285 of Main Chassis

C28 0.001UF/1KV

ZD1 5W 180V

D1 1A 600V

IC1 TOP233Y

R3 13K

L6 RH3.5*0.8*4.7

D2

R12 22R

250mA 200V

C21 0.1UF/50V

TLP721 IC2

C29 0.22UF/50V

R14 2K

IC3 AN1431

R16 10K

R25 3.3K

R11 22R

C20 0.1UF/50V

C6 47UF/16V

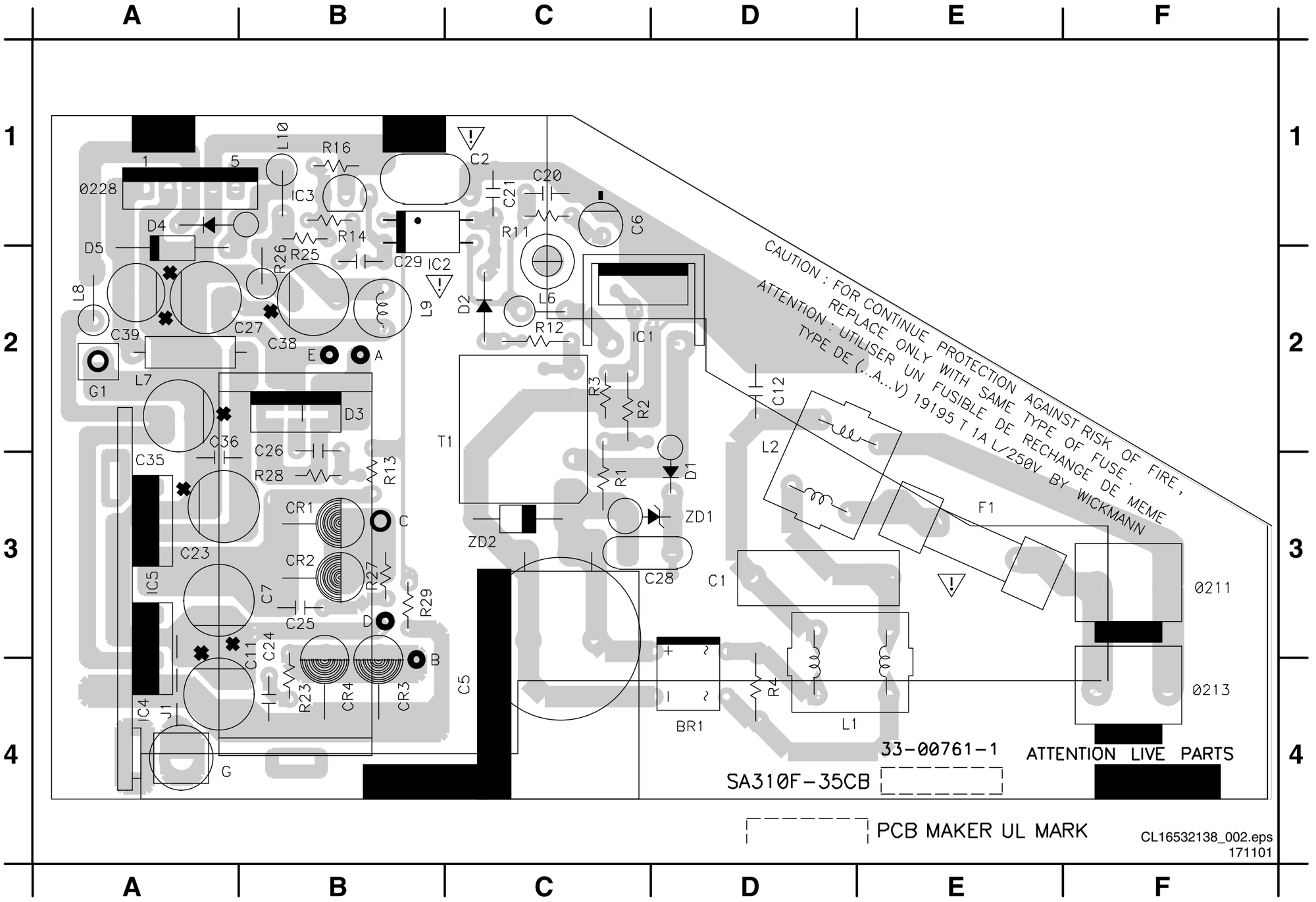
C2 470PF/ 250V

HOT Ground

COLD Ground

CL16532138_001.eps
121101

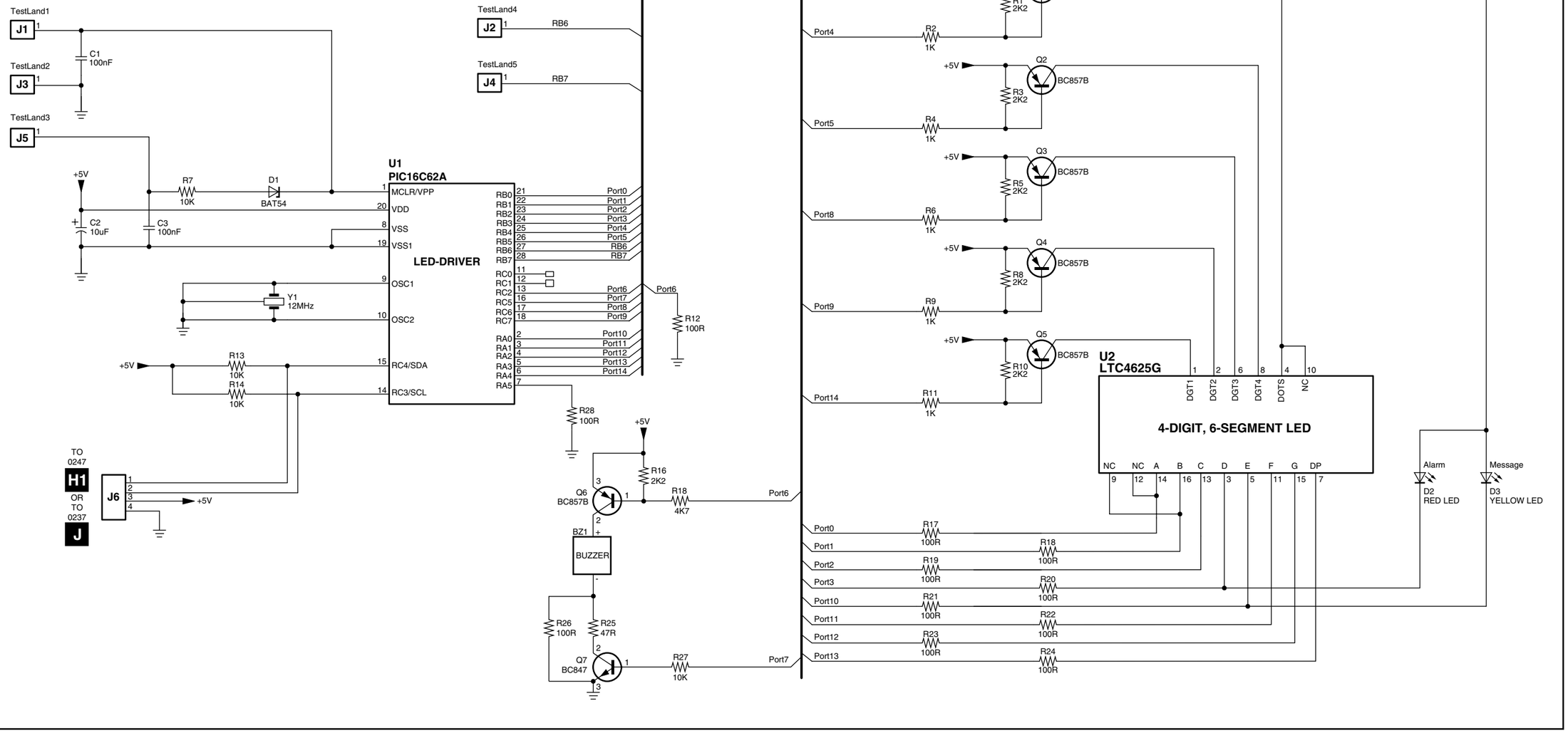
Layout EPS 4 (External Power Supply)

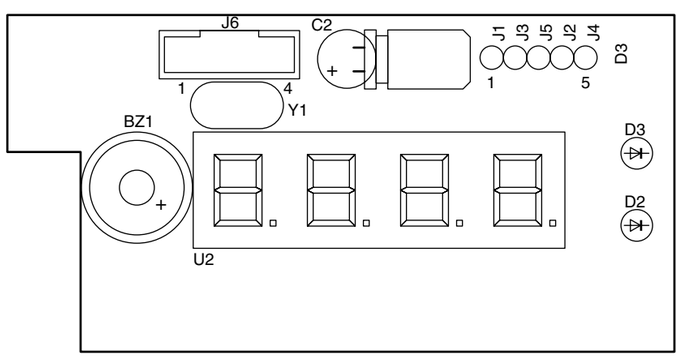


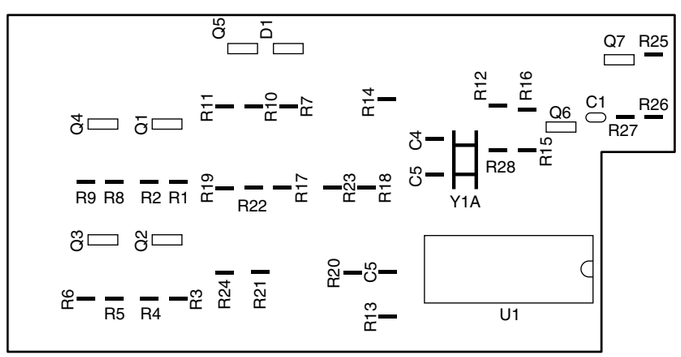
211	F3	R13	B3
213	F4	R14	B1
228	A1	R16	B1
BR1	D4	R23	B4
C1	D3	R25	B2
C2	C1	R26	B2
C5	C4	R27	B3
C6	C1	R28	B3
C7	B3	R29	B3
C11	B3	ZD1	D3
C12	D2	ZD2	C3
C20	C1		
C21	C1		
C23	A3		
C24	B3		
C25	B3		
C26	B2		
C27	B2		
C28	D3		
C29	B2		
C35	A3		
C36	A2		
C38	B2		
C39	A2		
CR1	B3		
CR2	B3		
CR3	B4		
CR4	B4		
D1	D3		
D2	C2		
D3	B2		
D4	A1		
D5	A2		
F1	E3		
G1	A2		
IC1	C2		
IC2	B2		
IC3	B1		
IC4	A4		
IC5	A3		
J1	A4		
L1	D4		
L2	D2		
L6	C2		
L7	A2		
L8	A2		
L9	B2		
L10	B1		
R1	C3		
R2	C2		
R3	C2		
R4	D4		
R11	C1		
R12	C2		
R13	B3		

Clock Display

G CLOCK DISPLAY







CL 16532139_005.eps
141201

UIR / LS / Vbat Module

H UIR/LS/VBAT MODULE

T0 0251 OF **A1**

POWER SUPPLY

1251 Main AUX, Gnd, Stdby, V_bat — 4-P (Black) Hor Conn

MP40 F1

R24 15R, R25 15R

U4 IM7805CT (IN, OUT, Gnd)

C6 100nF, C7100nF, +5V

R26 3K3 (5W), R27 82K, R28 82K, Q6 BF422

R29 10K, Q7 BC557B

0237 SDA, SCL, +5V, Gnd — 4-P (White) Hor Conn

T0 0237 OF **G** CLOCK

+5V, C3 100nF, U3 HEF4053

R5 4K7

R6 100R, R7 100R, R8 1K0, R9 100R

U1 Clock, Data_in, +5V, Data_out, Gnd, IR_data — RJ11 (1 LED, 2 IR_in, 3 Mode, 4 Status, 5 Gnd, 6 IR_out)

C2 100nF

R2 10K, R3 10K, R4 10K, Q1 BC847B

R14 10K, R15 10K, R16 10K

1240 Data_Out, Data_In, Clock, Gnd, Treble (SCL) — 5-P (White) Hor Conn

T0 0240 OF **A7** CONTROL

D2 C6V8, D3 C6V8, D4 C6V8

R17 100K, Q1 BC857B, R18 100R

R22 47R, D5 C6V8, BC847B, R21 1K, Q2 BC847B, R20 10K, R19 100K

R33 0R0

0259 IR_in, +3.3V, Gnd, IR_out, LED — 5-P (Black) Hor Conn

T0 0259 OF **A12** FRONT CONTROL

R11 10K, R10 0R0

J4 — F-pin Conn

T0 0262 OF **A13** REAR I/O CINCH

TO TV SPK

Fishhood J5

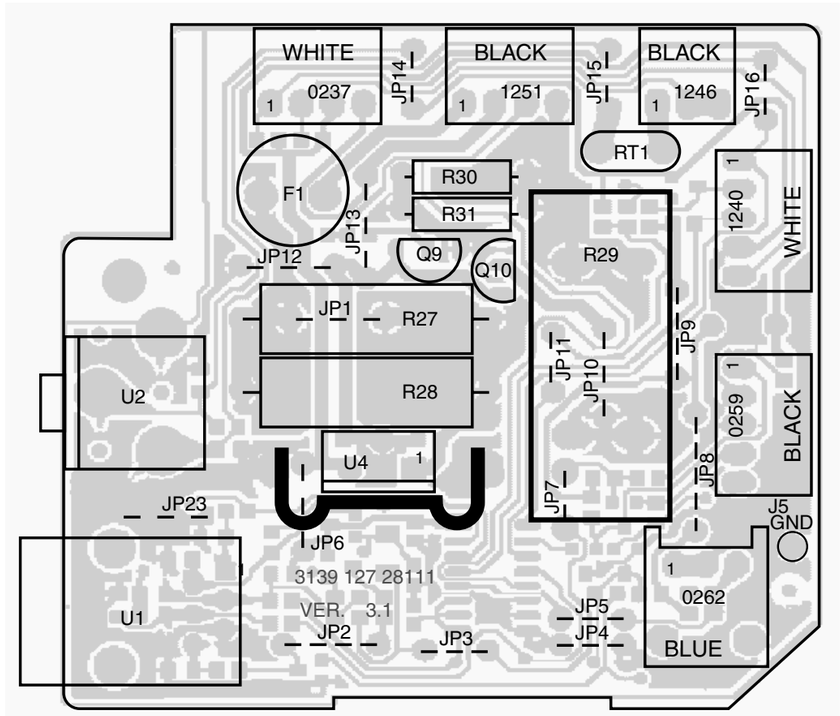
U2 Phone Jack — RT1 RXE 030, C5 2n2, D7 C22V, D8 C22V

1246 Spk-, Spk+ — 3-P (Black) Ver

CL 16532138_029.eps 211201

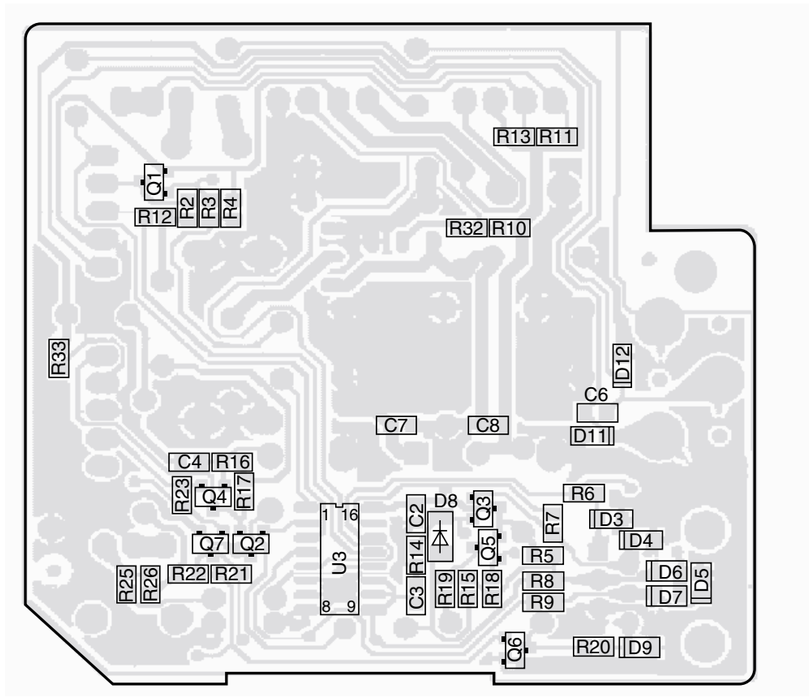
C2	D4
C3	C3
C5	G3
C6	A5
D2	D3
D3	D3
D4	D3
D5	F3
D7	G3
D8	G3
F1	A2
J4	G7
J5	G1
Q1	C6
Q1	E4
Q2	F4
Q6	B4
Q6	F4
Q7	B4
RT1	G4
R10	G5
R11	F6
R14	D6
R15	D6
R16	D6
R17	E3
R18	E4
R19	F5
R02	C6
R20	F4
R21	F4
R22	E3
R24	A3
R25	A3
R26	A3
R27	B3
R28	B3
R29	B3
R03	C5
R33	E6
R04	C5
R05	C3
R06	C3
R07	C3
R08	D3
R09	D3
U1	C3
U2	G2
U3	C3
U4	A5
0237	A7
0259	F7
1240	D7
1246	G4
1251	A2

Layout UIR / LS / Vbat Module (Top View)



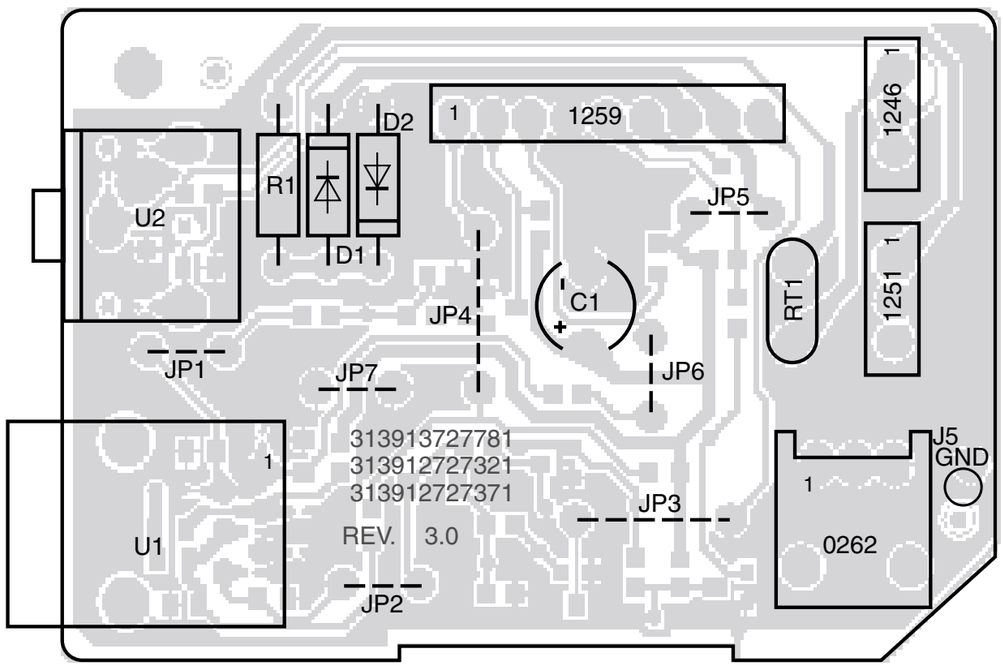
CL 16532138_030.eps
191201

Layout UIR / LS / Vbat Module (Bottom View)



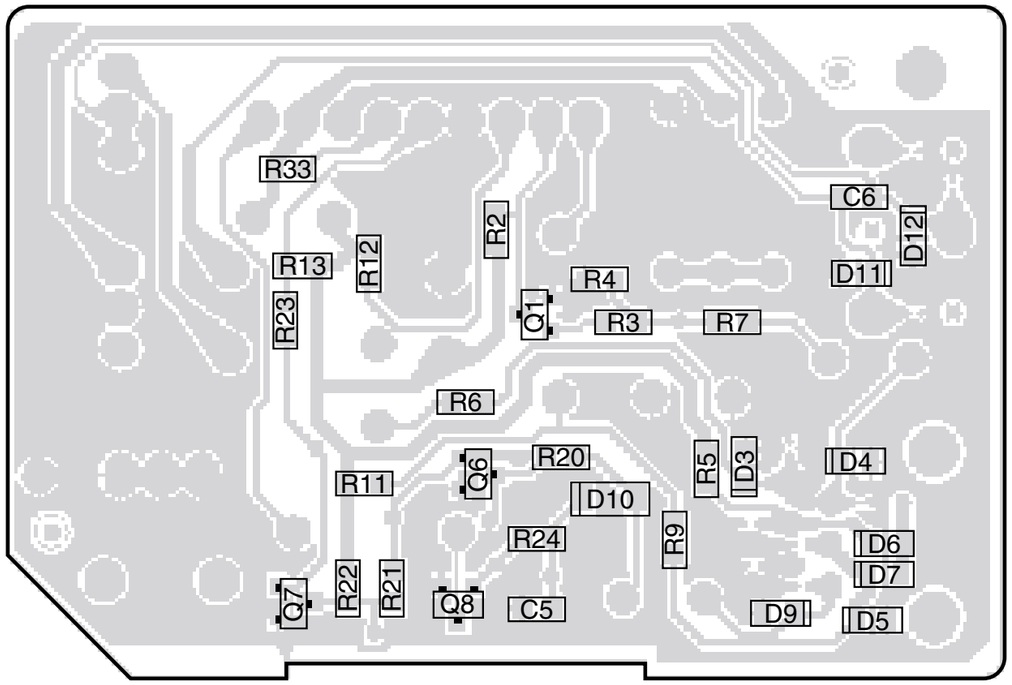
CL 16532138_031.eps
191201

Layout SP/LS Module (Top View)



CL 16532138_008.eps
201101

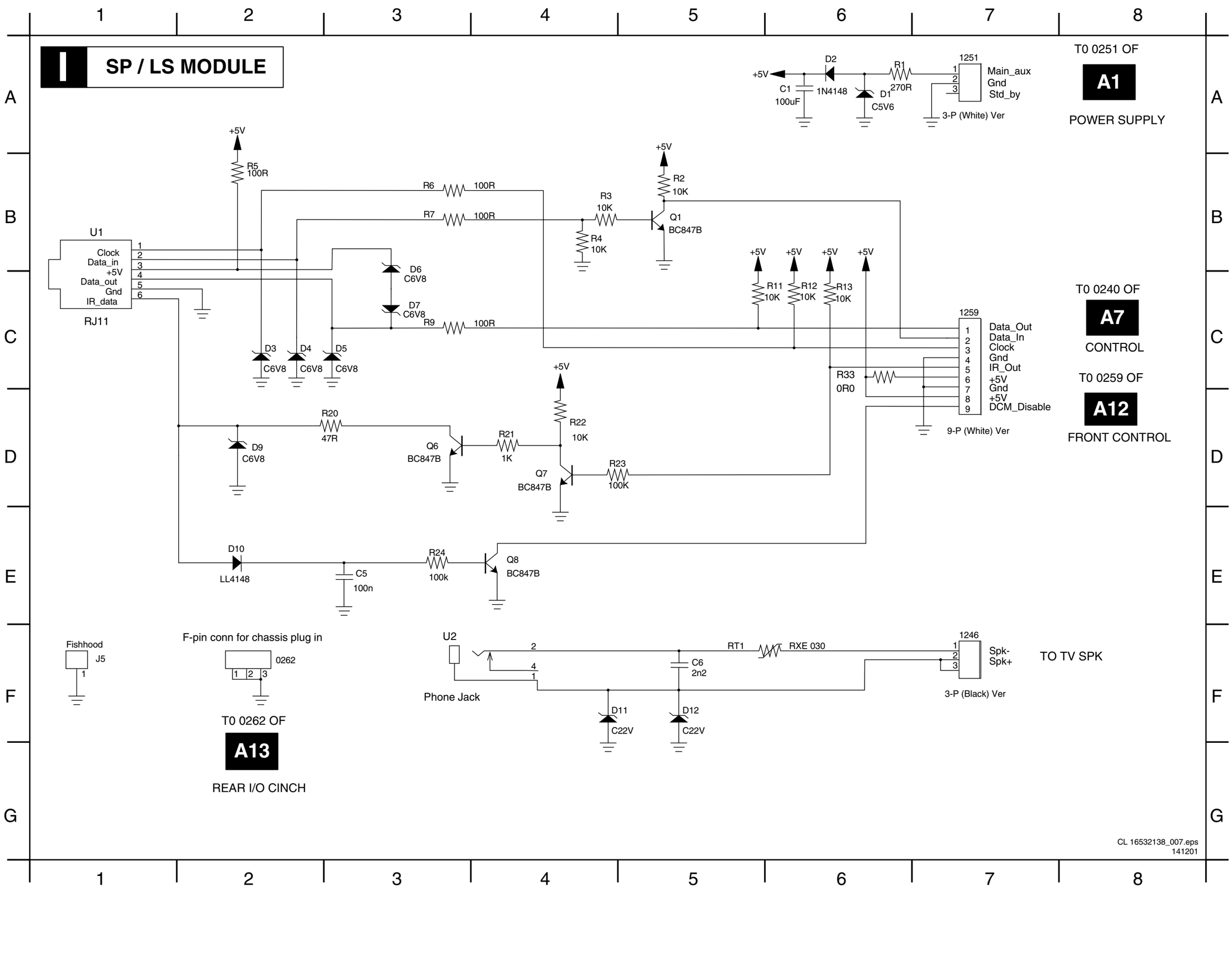
Layout SP/LS Module (Bottom View)



CL 16532138_009.eps
201101

SP/LS Module

SP / LS MODULE



0262	F2
1246	F7
1251	A7
1259	C7
C1	A6
C5	E3
C6	F5
D1	A6
D10	E2
D11	F4
D12	F5
D2	A6
D3	C2
D4	C2
D5	C3
D6	B3
D7	C3
D9	D2
J5	F1
Q1	B5
Q6	D3
Q7	D4
Q8	E4
R11	C5
R12	C6
R13	C6
R2	B5
R20	D3
R21	D4
R22	D4
R23	D5
R24	E3
R3	B4
R33	C6
R4	B4
R5	B5
R6	B2
R7	B3
R9	C3
RT1	F6
U1	B1
U2	F3

Interface Panel

J INTERFACE PANEL

TO 0228 OF F EPS — 0228 EH-B(5) — +5Veps, GND, +12Veps, GND, +3.3Veps — (Red)

USA ONLY: 3740 220R-NL, BZX79-C5V1-NL 6703, 2703, 100u-NL

TO CHASSIS CON 0251 — TO 0251 A1 POWER SUPPLY — 0251 EH-B(4) — Main Aux, GND, STDBY, 140/95V — (Black)

6701 BYD33D; 3739 6R8 (1.3W) (Double footprint); 1700 400mA; 7711 BC847B; 3737 120K; 2704 1u; 3706 68K; 3747 10K -NL; 3738 6K8; 6702 BAS216; 3705 22K

EUROPE & AP ONLY

+5V: 3704 4K7, 7712 BC847B, 3702 22K, 3701 22K, 3700 5K6, 2701 100n, 7710 DS1813R-5 (VCC, Reset, GND), 5705 56u, 2700 1u, 2702 1u

+12Veps

9020 UUMPER; 1775 LV-NL

1800 32 PIN CONN: 1 3.3Veps; 2 GND_POWER; 3 +12Veps; 4 GND IIC; 5 IR_data; 6 POR; 7 CLK; 8 DATA_IN; 9 DATA_OUT; 10 5Veps; 11 HSYNC_OUT; 12 VSYNC_OUT; 13 GND_CVBS_in; 14 SCL; 15 SDA; 16 Reserved; 17 B_in; 18 G_in; 19 R_in; 20 FBL_in; 21 GND_CVBS_out; 22 CVBS_Out; 23 NC; 24 Reserved; 25 NC; 26 GND_Audio_in; 27 F_R_aud_out; 28 F_L_aud_out; 29 R_audio_in; 30 L_audio_in; 31 Y_video_in; 32 C_video_in

TO 0259 OF A12 FRONT CONTROL — 0259 EH-B(5) — IR, +5, GND

4011 0R0; 4012 0R0; 3716 10K NOT USED; 3745 10K (1/6W); 3708 47K; 3707 10K; 7700 BC847B; 3710 47K; 7701 BC847B; 3715 100R; 6704 BZX284-C6V2; 6706 BZX284-C6V2; 3746 10K

TO 1259 I SP/LS — 1259 EH-B(9) — Data Out/SDA, Data In, Clock, GND, IR, STDBY, GND, 5Vs, Clock Disable

TO 0240 A7 CONTROL — 0240 EH-B(7) — POR, Data Out/SDA, Data In, Clock, GND, SCL

3717 10K; 3729 10K; 3743 100R; 3744 100R; 2711 100p; 2712 100p

7715 BC847B; 2705 22p; 3718 10K; 3719 5K6; 7706 BC847B; 3742 4K7-NL; 3720 10K; 7705 BC857B; 3721 4K7; 3722 4.7K; HSYNC

3748 10K; 7718 BC847B; 3749 10K; 2714 2n2; 7717A 74HCT74D (VCC, GND, D, CLK, CL, PR, Q, Q)

TO 0240 OF A7 CONTROL — 0217 EH-B(4) — GND, +8V, Sandcastle, GND

TO 0240 OF G CLOCK Europe — 0237 EH-B(4) — SDA, SCL, +5V, GND

2713 100n

7708 BC847B; 3731 820R; EGND

USA ONLY: 1002 EH-B(3)-NL — Audio_R_out, Audio_L_out, GND — DGND

+8V; 7716 BC847B; 3703 75R; 3741 1K; EGND

TO 0242 A13 REAR I/O CINCH; A14 REAR I/O SCART — 0242 EH-B(10) — G, GND, B, R, FBL, GND, VIDEO OUT, GND, Ext2Video/Y, C — (White)

TO 0227 & 0225 A13 REAR I/O CINCH; A14 REAR I/O SCART — 0227 EP-B(6) — Audio_R_out, Audio_L_out, GND, L2-in/mono, R2-in, GND — (Black)

2710 100n; 3733 47K; 2709 100n; 3734 47K; DGND

3735 75R-NL; 3736 75R; EGND

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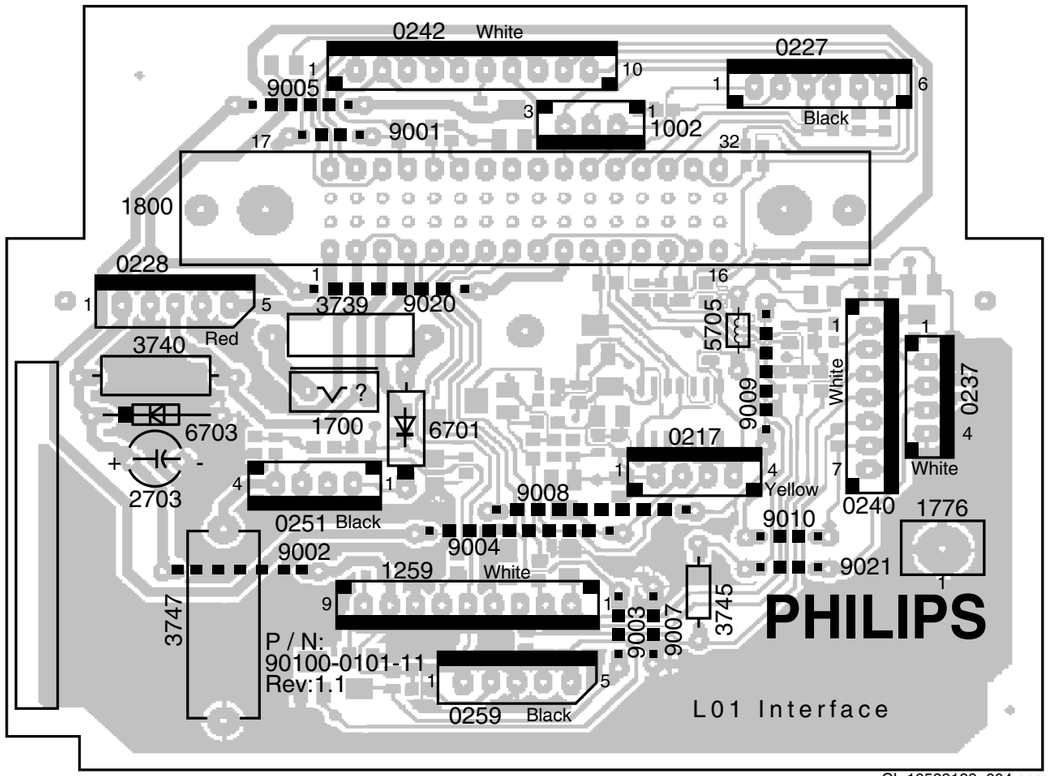
171201

Layout Interface Panel



CL 16532138_004.eps
171101

Personal Notes:

8. Alignments

Index:

Note:
- The Service Default Alignment Mode (SDAM) is described in chapter 5.
- Menu navigation is done with the 'CURSOR UP, DOWN, LEFT or RIGHT' keys of the remote control transmitter.
- Figures can deviate slightly from the actual situation, due to different set executions or software versions.

8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:
- AC voltage and frequency: according to country's standard.
- Connect the set to the AC power via an isolation transformer.
- Allow the set to warm up for approximately 20 minutes.
- Measure the voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply). Never use the cooling fins / plates as ground.
- Test probe: Ri > 10 MΩ; Ci < 2.5 pF.
- Use an isolated trimmer / screwdriver to perform the alignments.

8.2 Hardware Alignments

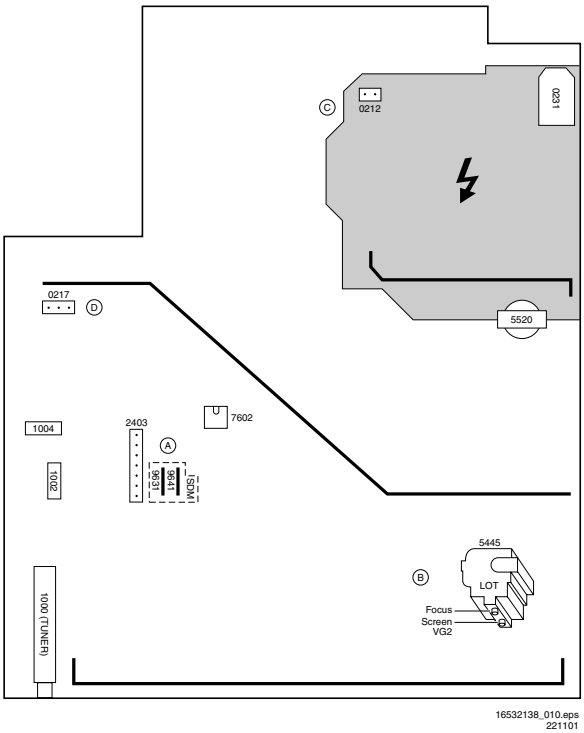


Figure 8-1

8.2.1 Vg2 Adjustment (AKB method)

1. Connect the RF output of a pattern generator to the antenna input. Test pattern is a 'black' picture (blank screen on CRT without any OSD info). Set TV to AV mode.
2. Activate the SDAM.
3. Select Options and set item "protection" to off.
4. Select Deflection menu.
   – Set AKB to OFF (OFF=1 position, CCC loop disabled)
   – Set BRIGHTNESS to 75%
   – Set CONTRAST and BRIGHTNESS to zero.
5. Unplug the vertical deflection coil connector "0222" (one bright vertical line).
6. Adjust Vg2 until the vertical line just appears.
7. Connect back the deflection coil connector "0222"
8. Set AKB back to ON (=0).
9. Restore BRIGHTNESS and CONTRAST to normal picture setting.
10. Select Options and set item "protection" back to on.
11. Return to the SDAM (main menu) via the MENU key
12. Exit service mode

8.2.2 Focusing

1. Tune the set to a circle or crosshatch test pattern (use an external video pattern generator).
2. Choose picture mode NATURAL with the 'SMART PICTURE' button on the remote control transmitter.
3. Adjust the FOCUS potentiometer (see Fig. 8-1) until the vertical lines at 2/3 from east and west, at the height of the centreline, are of minimum width without visible haze.

8.3 Software Alignments and Settings

Activate the Service Default Alignment Mode (see chapter 5). The SDAM menu will now appear on the screen.
Select one of the following alignments:
1. OPTIONS
2. DEFLECTION
3. TUNER
4. WHITE TONE
5. GEOMETRY

8.3.1 Options

Table 8-1

LLLL AAAABC X.Y	S
ERR XX XX XX XX XX	
OP XXX XXX XXX XXX XXX XXX XXX	
OB0	XXX
OB1	XXX
OB2	XXX
OB3	XXX
OB4	XXX
OB5	XXX
OB6	XXX
LOAD DEFAULT	>
WATCHDOG	ON / OFF
PROTECTION	ON / OFF
SOUND	NONE / 3415 / 3465
DEFAULT SOUND	WEST-EU / UK / EAST-EU / FRANCE
QSS	ON / OFF
PIN2	NONE / UIR MSG
PIN77	NONE / I2C
CLOCK	OSD / LED / NONE
BUZZER	NONE / INT / EXT
EW	ON / OFF
WIDESCREEN	ON / OFF
TUNER	NONE / APLS / PHILIPS
LNA	ON / OFF
RADIO	ON / OFF
WSL	NONE / 4136 / 1836
ACTIVE-OFF LED	ON / OFF
RGB	ALWAYS / AV
AV1	ON / OFF
AV2	ON / OFF
AV3	ON / OFF
AV2YC	ON / OFF
NO IDENT STANDBY	ON / OFF

Note: Options are used to control the presence / absence of certain features and hardware.

How to Change an Option Byte

An Option Byte represents a number of different options. Changing these bytes directly makes it possible to set all options very fast. All options are controlled via seven option bytes. Select the option byte (OB1.. OB7) with the MENU UP/ DOWN keys, and enter the new value.

Leaving the OPTION submenu and switching the set off with the standby button on the remote saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched OFF and ON with the AC power switch (cold start)

How to Calculate the Value of an Option Byte

Calculate an Option Byte value (OB1 .. OB7) in the following way:

1. Check the status of the single option bits (OP): are they enabled (1) or disabled (0).
2. When an option bit is enabled (1) it represents a certain value (see first column 'value between brackets' in first table below). When an option bit is disabled, its value is 0.
3. The total value of an Option Byte is formed by the sum of its eight option bits. See second table below for the correct Option Bytes per typenumber.

Table 8-2

Bit (value)	OB1	OB2	OB3	OB4	OB5	OB6	OB7
0 (1)	OP10	OP20	OP30	OP40	OP50	OP60	OP70
1 (2)	OP11	OP21	OP31	OP41	OP51	OP61	OP71
2 (4)	OP12	OP22	OP32	OP42	OP52	OP62	OP72
3 (8)	OP13	OP23	OP33	OP43	OP53	OP63	OP73
4 (16)	OP14	OP24	OP34	OP44	OP54	OP64	OP74
5 (32)	OP15	OP25	OP35	OP45	OP55	OP65	OP75
6 (64)	OP16	OP26	OP36	OP46	OP56	OP66	OP76
7 (128)	OP17	OP27	OP37	OP47	OP57	OP67	OP77
Total:	Sum	Sum	Sum	Sum	Sum	Sum	Sum

Table 8-3

L01 ITV Europe Options	OB1	OB2	OB3	OB4	OB5	OB6	OB7
14HT3154/01	8	16	2	1	3	117	0
14HT3154/05	8	16	2	1	3	117	0
14HT3304/01	8	21	9	1	3	122	0
14HT3304/05	8	21	9	1	3	122	0
17HT3154/01	8	16	2	1	3	117	0
17HT3154/05	8	16	2	1	3	117	0
17HT3304/01	8	21	9	1	3	122	0
17HT3304/05	8	21	9	1	3	122	0
17HT5404/01Z	8	17	2	9	22	122	0
17HT5404/05Z	8	17	2	9	22	122	0
17HT5404/21R	8	17	2	9	22	122	0
17HT5404/25R	8	17	2	9	22	122	0
21HT3154/01	8	16	2	1	3	117	0
21HT3154/05	8	16	2	1	3	117	0
21HT3304/01	9	21	9	1	3	122	0
21HT3304/05	9	21	9	1	3	122	0
21HT5404/01Z	9	17	2	9	22	122	0
21HT5404/05Z	9	17	2	9	22	122	0
21HT5404/21R	9	17	2	9	22	122	0
21HT5404/25R	9	17	2	9	22	122	0

Option Bit Assignment
Following are the option bit assignments for all L01 ITV software clusters.

Table 8-4

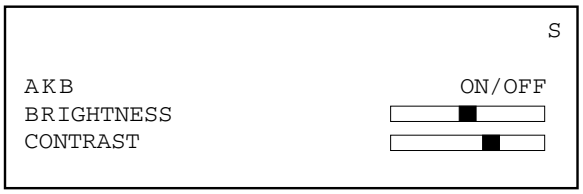
Options	Bit	Description	Value
Byte 0	7	Multi-system	0 = Multi, 1 = Dual I-DK
(TV System)	6		
	5		
	4	Default sound	1 = BG (or West EU), 2 =I (or UK), 3 = DK (or East EU), 4 = M, 5 = LL (or France)
	3		
	2		
	1	Sound Board	0 = Mono (no sound board), 1 = MSP 3415G, 2 = MSP 3445G - (BTSC), 3 = MSP 3465G - AV stereo
	0		
Byte 1	7	Not Used	
(Pin Usage)	6	Not Used	
	5	Not Used	
	4	QSS	1 = UOC and chasis support QSS
	3	Pin 2	0 = None (not used), 1 = UIR-Link Message Input
	2		
	1	Pin 77	0 = None (not used), 1 = SPI I^2C (at 32-pin card interface)
	0		
Byte 2	7	Pin 78	0 = None (not used), 1 =Wide Screen, 2 = Rotation/Tilt
(Devices)	6		
	5	EW	1 = Chasis supports East-West alignment
	4	China	1 = Vision IF is set for China
	3	Radio	1 = Tuner has FM radio feature and TV chasis support FM radio
	2	LNA	1 = Tuner has LNA feature
	1	Tuner	0 = None (no tuner), 1 = Philips (model), 2 = Alps (model)
	0		
Byte 3	7	Not Used	
(Devices)	6	Not Used	
	5	Not Used	
	4	US Region Code	1 = US Region code is used in SmartPort (except command 0x00)
	3	SmartPort	1 = Chasis supports SmartPort (SPI or I^2C)
	2	Active-Off LED	1 = LED ON
	1	WSL	0 = None (no used), 1 =4136 (IR receiver model), 2 =1836 (IR receiver model)
	0		
Byte 4	7	Not Used	
(AV, Tuning)	6	Not Used	
	5	Not Used	
	4	AVYC	1 = AV available
	3	AV3	1 = AV available
	2	AV2	1 = AV available
	1	AV1	1 = AV available
	0	RGB	0 = RGB input always allowed, 1 = RGB insertion allowed only when current input source is AV1
Byte 5	7	Not Used	
(Feature)	6	Protection	1 = Protection (TV go to standby). 0 = No protection but errors are still logged.
	5	WatchDog	1 = Watchdog feature is enabled
	4	No Ident Standby	1 = TV goes standby after 10mins of no RF signal.
	3	Buzzer Type	0 = None (no buzzer), 1 = Internal (generated by TV microp), 2 = External (generated by I^2C device)
	2		
	1	Clock Type	0 = None (no clock), 1 = OSD, 2 = LED Module
	0		
Byte 6	7	Not Used	
	6	Not Used	
	5	Not Used	
	4	Not Used	
	3	Not Used	
	2	Not Used	
	1	Not Used	
	0	Not Used	

8.3.2 Deflection

The Deflection Sub menu contains the following items:
- AKB, ON to enable, OFF to disable the 'black current loop' (AKB = Auto Kine Bias).
- Brightness, (set Brightness)
- Contrast, (set Contrast)

"See Vg2 alignment"

Deflection Menu



CL 16532138_020.eps
141201

Figure 8-2

8.3.3 Tuner

Note: Described alignments are only necessary when the NVM (item 7602) is replaced.

Tuner Submenu

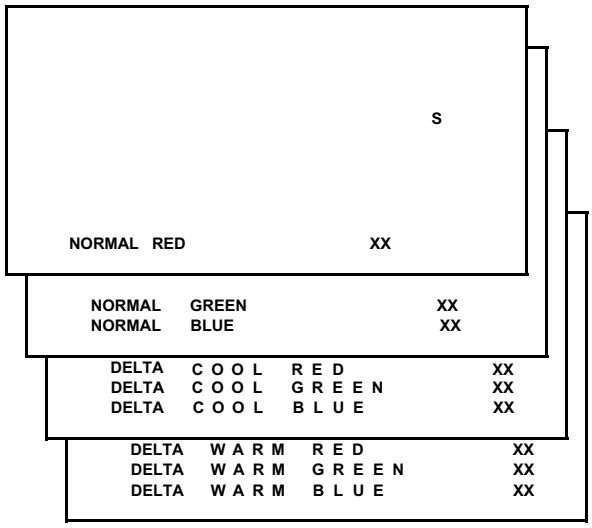
CL 16532108_010.eps
131201

Figure 8-3

The Tuner Sub menu contains the following items:
- Phase Locked Loop used for FST tuning systems. Adjust the IFPLL value (default value is 30) with the LEFT/RIGHT cursor keys.
- (AGC take over point) asis Emphasistype= 'Bold'>Set the external pattern generator to a colour bar video signal and connect the RF output to aerial input. Set amplitude to 10 mV and set frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC). Connect a DC multimeter to pin 1 of the tuner (item 1000 on the main panel).
  1. Activate the SDAM.
  2. Go to the TUNER sub menu.
  3. Select AGC with the UP/DOWN cursor keys.
  4. Adjust the AGC-value (default value is 28) with the LEFT/RIGHT cursor keys until the voltage at pin 1 of the tuner lies between 3.8 and 2.3 V.
  5. Switch the set to STANDBY.
- **Slicing level**
  Slicing level for the vertical sync. This adjustment is always set to 0 (for NTSC system only).
- **CL (cathode drive level)**
  Adjust the CL value (default value is 4) with the LEFT/RIGHT cursor keys.

8.3.4 White Tone

White Tone Menu



CL 16532108_007.eps
131201

Figure 8-4

In the WHITE TONE sub menu, the values of the black cut off level can be adjusted. Normally, no alignment is needed for the WHITE TONE. You can use the given default values.
The colour temperature mode (NORMAL, COOL and WARM) and the colour (RED, GREEN, and BLUE) can be selected with the UP/DOWN RIGHT/LEFT cursor keys. The value can be changed with the LEFT/RIGHT cursor keys. First, select the values for the NORMAL colour temperature. Then select the values for the DELTA COOL and DELTA WARM mode. After alignment, switch the set to standby, in order to store the alignments.

Default settings:
- NORMAL (colour temperature = 11500 K):
  - NORMAL RED = 32
  - NORMAL GREEN = 35
  - NORMAL BLUE = 30
- DELTA COOL (colour temperature = 14000 K):
  - DELTA COOL RED = 0
  - DELTA COOL GREEN = -5
  - DELTA COOL BLUE = 5
- DELTA WARM (colour temperature = 8200 K):
  - DELTA WARM RED = 8
  - DELTA WARM GREEN = -3
  - DELTA WARM BLUE = 2

8.3.5 Geometry

The geometry alignments menu contains several items to align the set, in order to obtain correct picture geometry.

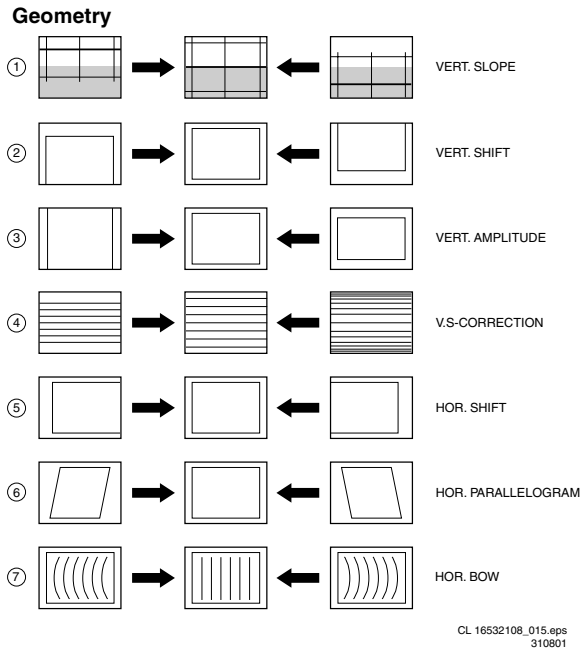


Figure 8-5

Connect an external video pattern generator to the aerial input of the TV-set and input a crosshatch test pattern. Set the generator amplitude to at least 1 mV and set frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).

1. Activate the SDAM menu (see chapter 5).
2. Go to the GEOMETRY sub menu.

Now you can perform the following alignments:

- **Horizontal Parallelogram (HP)**
  Align straight vertical lines in the top and the bottom; vertical rotation around the centre.
- **Horizontal Bow (HB)**
  Align straight horizontal lines in the top and the bottom; horizontal rotation around the centre.
- **Horizontal Shift (HS)**
  Align the horizontal centre of the picture to the horizontal centre of the CRT.
- **Vertical Slope (VS)**
  Align the vertical centre of the picture to the vertical centre of the CRT. This is the first of the vertical alignments to perform. For an easy alignment, set SBL to ON.
- **Vertical Amplitude (VA)**
  Align the vertical amplitude so that the complete test pattern is visible.
- **Vertical S-Correction (SC)**
  Align the vertical linearity, meaning that vertical intervals of a grid pattern must be equal over the entire screen height.
- **Vertical Shift (VSH)**
  Align the vertical centring so that the test pattern is located vertically in the middle. Repeat the 'vertical amplitude' alignment if necessary.
- **Service Blanking (SBL)**
  Switch the blanking of the lower half of the screen ON or OFF (to be used in combination with the vertical slope alignment).

For EW versions

- Set Horizontal Parallelogram to prevent the picture from slanting to one side.
- Set Horizontal Bow to prevent the top and bottom of picture from bending to the sides.
- Select Vertical Zoom to align the vertical linearity over the entire screen height (for 16 : 9 applications only).
- Set Trapezium Correction to align the lines at the vertical sides.
- Select East-West Width and align the picture width until the side castellations disappear.
- Select East-West Parabola / width and align the vertical sides until the sides are straightened.
- Select Upper Corner Parabola to straighten the top of the vertical lines at the sides.
- Select Lower Corner Parabola to straighten the bottom of the vertical lines at the sides.
- Repeat the last 5 steps if necessary.

Geometry alignments menu

Table 8-5

	S
SC	XX
SBL	ON/OFF
VS	XX
VSH	XX
VA	XX
HS	XX
HP	XX
HB	XX

9. Circuit Description

Index of this chapter:
1. Introduction
2. Audio Signal Processing
3. Video Signal Processing
4. Synchronisation
5. Deflection
6. Power Supply
7. Control
8. Abbreviations

Notes:
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the block diagram in chapter 6, or the electrical diagrams in chapter 7. Where necessary, you will find a separate drawing for clarification.

9.1 Introduction

The L01 chassis is a global TV chassis for the model year 2001 and is used for TV sets with screen sizes from 14" - 21" (small screen) to 21" - 32" (large screen).
The standard architecture consists of a Main panel, a Picture Tube panel, a Side I/O panel (not al executions) and a Top Control panel.
The Main panel consists primarily of conventional components with hardly any surface mounted devices.

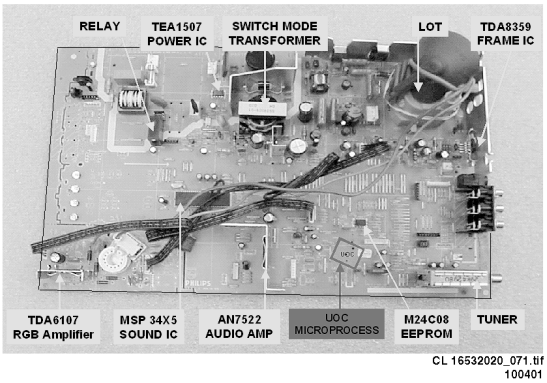


Figure 9-1

The functions for video processing, microprocessor (μP) and teletext (TXT) decoder are combined in one IC (TDA958xH), the so-called Ultimate One Chip (UOC). This chip is (surface) mounted on the copper side of the main panel.

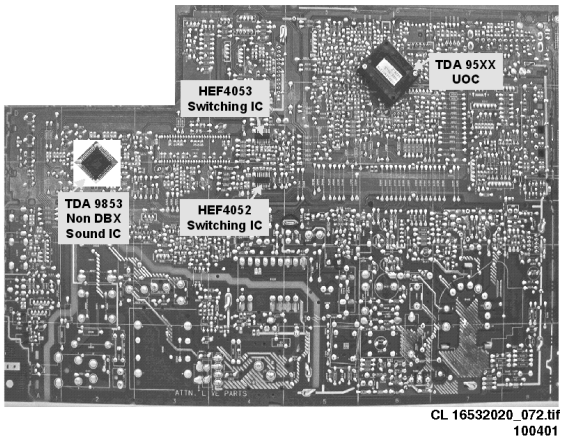


Figure 9-2

The L01 is divided into 2 basic systems, i.e. mono and stereo sound. While the audio processing for the mono sound is done in the audio block of the UOC, an external audio processing IC is used for stereo sets.

The tuning system features 100 video channels with on-screen display. The main tuning system uses a tuner, a microcomputer, and a memory IC mounted on the main panel. Also, in some type numbers, an FM radio is implemented with 40 pre-set channels.
The microcomputer communicates with the memory IC, the customer keyboard, remote receiver, tuner, signal processor IC and the audio output IC via the I^2C bus. The memory IC retains the settings for favourite stations, customer-preferred settings, and service/factory data.
The on-screen graphics and closed caption decoding are done within the microprocessor, and then sent to the signal processor IC to be added to the main signal.

The chassis uses a Switching Mode Power Supply (SMPS) for the main voltage source. The chassis has a 'hot' ground reference on the primary side and a cold ground reference on the secondary side of the power supply and the rest of the chassis.

9.2 Audio Signal Processing

9.2.1 Stereo

In stereo sets, the signal goes via the SAW filter (position 1004 in case of QSS demodulation and 1003 in case of Intercarrier demodulation), to the audio demodulator part of the UOC IC7200. The stereo audio output on pin 33 goes, via TS7206, to the stereo decoder 7831.
The switch inside the stereo decoder 7831 selects (via I^2C) either the internal decoder or an external source.
The NICAM + 2CS AM/FM stereo decoder is an ITT MSP34X5. The output is fed to the to the audio amplifier (AN7522 at position 7901). The volume level is controlled at this IC (pin 9) by a control line (VolumeMute) from the microprocessor. The audio signal from 7901 is then sent to the speaker/headphone output panel.

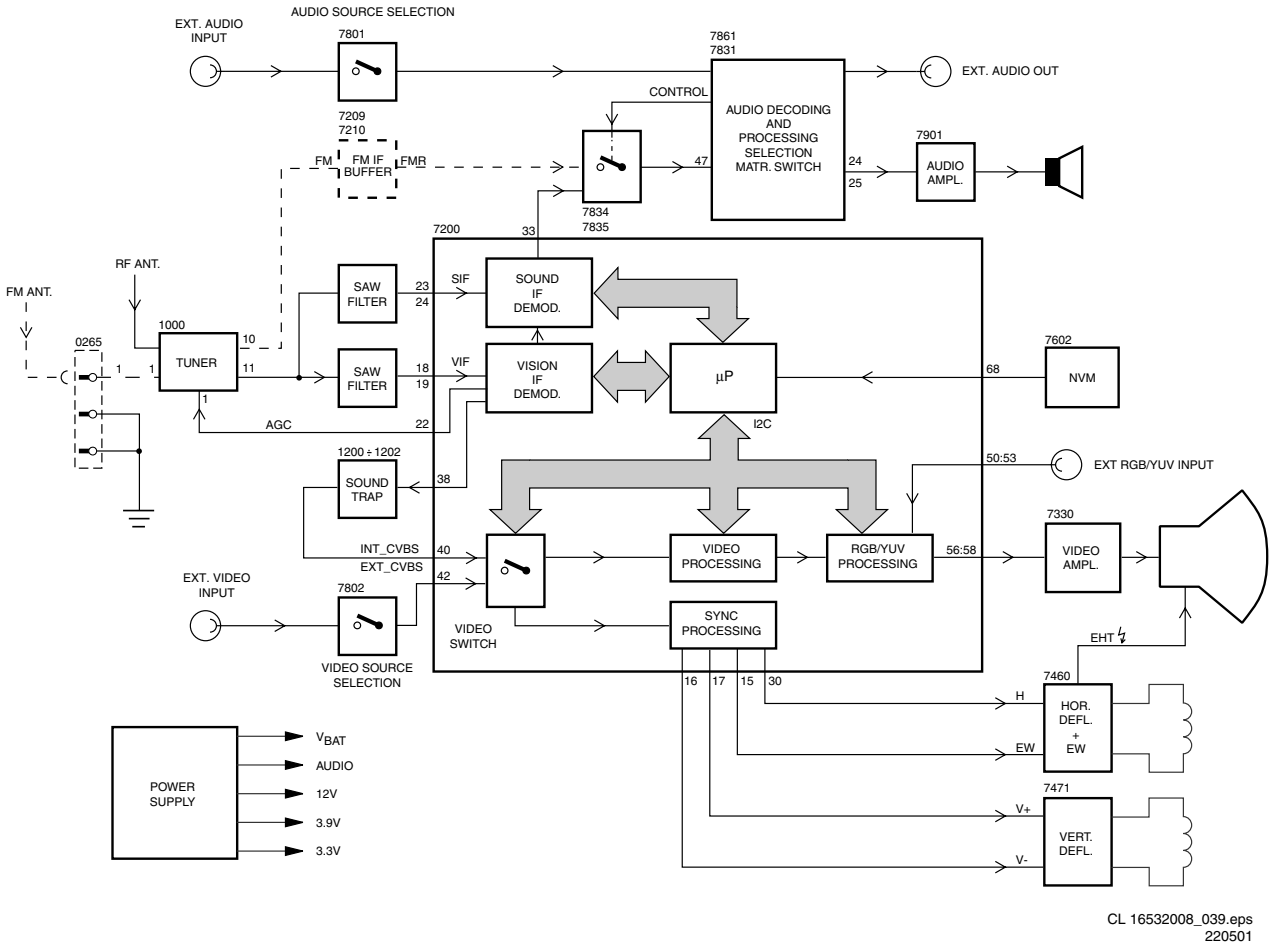


Figure 9-3

9.2.2 Mono

In mono sets, the signal goes via the SAW filter (position 1004 in case of QSS demodulation and 1003 in case of Intercarrier demodulation), to the audio demodulator part of the UOC IC7200. The audio output on pin 48 goes directly, via buffer 7943, to the audio amplifier (AN7523 at position 7902). The volume level is controlled at this IC (pin 9) by a 'VolumeMute' control line from the microprocessor. The audio signal from IC7902 is then sent to the speaker/ headphone output panel.

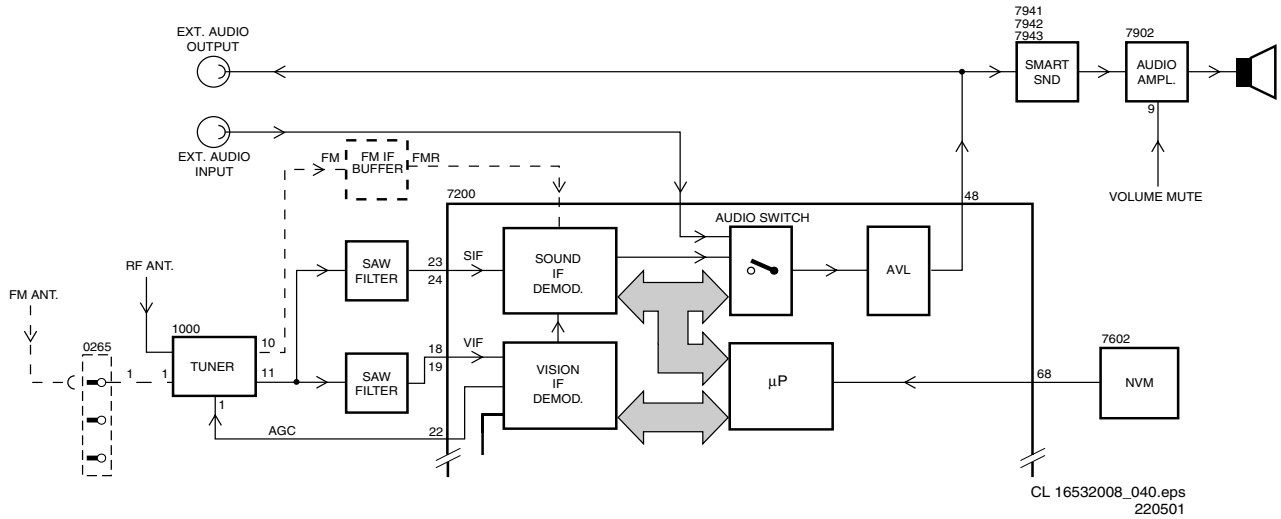


Figure 9-4

9.2.3 FM radio (if present)

The FM radio uses the 10.7 MHz concept. This SIF frequency is available at pin 10 of the tuner. Via a pre-amplifier (TS7209 and TS7210), the signal is fed for demodulation to either the UOC (for mono FM radio) or by the Micronas MSP34X5 (for stereo FM radio).

9.3 Video Signal Processing

9.3.1 Introduction

The video signal-processing path consists of the following parts:

- RF signal processing.
- Video source selection.
- Video demodulation.
- Luminance/Chrominance signal processing.
- RGB control.
- RGB amplifier

The processing circuits listed above are all integrated in the UOC TV processor. The surrounding components are for the adaptation of the selected application. The I^2C bus is for defining and controlling the signals.

9.3.2 RF Signal Processing

The incoming RF signal goes to the tuner (pos. 1000), where the 38.9 MHz IF signal is developed and amplified. The IF signals then exits the tuner from pin 11 to pass through the SAW filter (position 1002 in case of QSS demodulation and 1003 in case of Intercarrier demodulation). The shaped signal is then applied to the IF processor part of the UOC (pos. 7200). Tuner AGC (Automatic Gain Control) will reduce the tuner gain and thus the tuner output voltage when receiving strong RF signals. Adjust the AGC take-over point via the Service Alignment Mode (SAM). The tuner AGC starts working when the video-IF input reaches a certain input level and will adjust this level via the I^2C bus. The tuner AGC signal goes to the tuner (pin 1) via the open collector output (pin 22) of the UOC. The IC also generates an Automatic Frequency Control (AFC) signal that goes to the tuning system via the I^2C bus, to provide frequency correction when needed.
The demodulated composite video signal is available at pin 38 and then buffered by transistor 7201.

9.3.3 Video Source Selection

The Composite Video Blanking Signal (CVBS) from buffer 7201 goes to the audio carrier trap filters (1200 and 1201) to remove the audio signal. The signal then goes to pin 40 of IC7200. The internal input switch selects the following input signals:

- Pin 40: terrestrial CVBS input
- Pin 42: external AV1 CVBS input
- Pin 44: external Side I/O CVBS or AV2 Luminance (Y) input
- Pin 45: external AV2 Chrominance (C) input

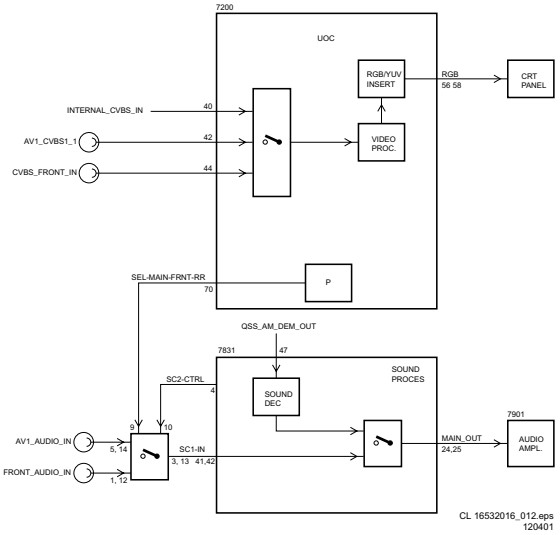


Figure 9-5

Once the signal source is selected, a chroma filter calibration is performed. The received colour burst sub-carrier frequency is used for this. Correspondingly, the chroma band pass filter for PAL processing or the cloche filter for SECAM processing is switched on. The selected luminance (Y) signal is supplied to the horizontal and vertical synchronisation processing circuit and to the luminance processing circuit. In the luminance-processing block, the luminance signal goes to the chroma trap filter. This trap is switched 'on' or 'off', depending on the colour burst detection of the chroma calibration circuit.
The group delay correction part can be switched between the BG and a flat group delay characteristic. This has the advantage that in multi-standard receivers no compromise has to be made for the choice of the SAW filter.

9.3.4 Video Demodulation

The colour decoder circuit detects whether the signal is a PAL, NTSC or SECAM signal. The result is made known to the auto system manager. The PAL/NTSC decoder has an internal clock generator, which is stabilised to the required frequency by using the 12 MHz clock signal from the reference oscillator of the microcontroller/teletext decoder.
The base-band delay line is used to obtain a good suppression of cross colour effects.
The Y signal and the delay line outputs U and V are applied to the luminance/chroma signal processing part of the TV processor.

9.3.5 Luminance/Chrominance Signal Processing

The output of the YUV separator is fed to the internal YUV switch, which switches between the output of the YUV separator or the external YUV (for DVD or PIP) on pins 51-53. Pin 50 is the input for the insertion control signal called ‘FBL-1’. When this signal level becomes higher than 0.9 V (but less than 3 V), the RGB signals at pins 51, 52 and 53 are inserted into the picture by using the internal switches.
Also some picture improvement features are implemented in this part:

- Black stretch This function corrects the black level of incoming signals, which have a difference between the black level and the blanking level. The amount of extension depends upon the difference between actual black level and the darkest part of the incoming video signal level. It is detected by means of an internal capacitor.
- White stretch This function adapts the transfer characteristic of the luminance amplifier in a non-linear way depending on the average picture content of the luminance

signal. It operates in such a way that maximum stretching is obtained when signals with a low video level are received. For bright pictures, stretching is not active.
- Dynamic skin tone correction This circuit corrects (instantaneously and locally) the hue of those colours which are located in the area in the UV plane that matches the skin tone. The correction is dependent on the luminance, saturation and distance to the preferred axis.

The YUV signal is then fed to the colour matrix circuit, which converts it to R, G and B signals.
The OSD/TXT signal from the microprocessor is mixed with the main signal at this point, before being output to the CRT board (pins 56, 57 and 58).

9.3.6 RGB Control

The RGB control circuit enables the picture parameters contrast, brightness and saturation to be adjusted, by using a combination of the user menus and the remote control. Additionally automatic gain control for the RGB signals via cut-off stabilisation is achieved in this functional block to obtain an accurate biasing of the picture tube. Therefor this block inserts the cut-off point measuring pulses into the RGB signals during the vertical retrace period.

The following additional controls are used:
- **Black current calibration loop** Because of the 2-point black current stabilisation circuit, both the black level and the amplitude of the RGB output signals depend on the drive characteristics of the picture tube. The system checks whether the returning measuring currents meet the requirements, and adapt the output level and gain of the circuit when necessary. After stabilisation of the loop, the RGB drive signals are switched on. The 2-point black level system adapts the drive voltage for each cathode in such a way that the two measuring currents have the right value. This is done with the measurement pulses during the frame flyback. During the first frame, three pulses with a current of 8 μA are generated to adjust the cut off voltage. During the second frame, three pulses with a current of 20 μA are generated to adjust the 'white drive'. This has as a consequence, that a change in the gain of the output stage will be compensated by a gain change of the RGB control circuit. Pin 55 (BLKIN) of the UOC is used as the feedback input from the CRT base panel.
- **Blue stretch** This function increases the colour temperature of the bright scenes (amplitudes which exceed a value of 80% of the nominal amplitude). This effect is obtained by decreasing the small signal gain of the red and green channel signals, which exceed this 80% level.
- **Beam current limiting** A beam current limiting circuit inside the UOC handles the contrast and brightness control for the RGB signals. This prevents the CRT from being overdriven, which could otherwise cause serious damage in the line output stage. The reference used for this purpose is the DC voltage on pin 54 (BLCIN) of the TV processor. Contrast and brightness reduction of the RGB output signals is therefore proportional to the voltage present on this pin. Contrast reduction starts when the voltage on pin 54 is lower than 2.8 V. Brightness reduction starts when the voltage on pin 54 is less than 1.7 V. The voltage on pin 54 is normally 3.3 V (limiter not active). During set switch 'off', the black current control circuit generates a fixed beam current of 1 mA. This current ensures that the picture tube capacitance is discharged. During the switch-off period, the vertical deflection is placed in an over-scan position, so that the discharge is not visible on the screen.

9.3.7 RGB Amplifier

From outputs 56, 57 and 58 of IC7200, the RGB signals are applied to the analogue output amplifiers on the CRT panel. The R-signal is amplified by a circuit built around transistors TS7311, 7312 and 7313, which drives the picture tube cathodes.
The supply voltage for the amplifier is +160 V and is derived from the line output stage.

9.4 Synchronisation

Inside IC7200 (part D), the vertical and horizontal sync-pulses are separated. These 'H' and 'V' signals are synchronised with the incoming CVBS signal. They are then fed to the H- and V-drive circuits and to the OSD/TXT circuit for synchronisation of the On Screen Display and Teletext (or Closed Caption) information.

9.5 Deflection

9.5.1 Horizontal Drive

The horizontal drive signal is obtained from an internal VCO, which is running at twice the line frequency. This frequency is divided by two, to lock the first control loop to the incoming signal.
When the IC is switched 'on', the 'Hdrive' signal is suppressed until the frequency is correct.
The 'Hdrive' signal is available at pin 30. The 'Hflybk' signal is fed to pin 31 to phase lock the horizontal oscillator, so that TS7401 cannot switch 'on' during the flyback time.
The 'EWdrive' signal for the E/W circuit (if present) is available on pin 15, where it drives transistor 7400 to make linearity corrections in the horizontal drive.

When the set is switched on, the '+8V' voltage goes to pin 9 of IC7200. The horizontal drive starts up in a soft start mode. It starts with a very short T_{ON} time of the horizontal output transistor. The T_{OFF} of the transistor is identical to the time in normal operation. The starting frequency during switch on is therefore about 2 times higher than the normal value. The 'on' time is slowly increased to the nominal value in 1175 ms. When the nominal value is reached, the PLL is closed in such a way that only very small phase corrections are necessary.

The 'EHTinformation' line on pin 11 is intended to be used as a 'X-ray' protection. When this protection is activated (when the voltage exceeds 6 V), the horizontal drive (pin 30) is switched 'off' immediately. If the 'H-drive' is stopped, pin 11 will become low again. Now the horizontal drive is again switched on via the slow start procedure.
The 'EHTinformation' line (Aquadag) is also fed back to the UOC IC7200 pin 54, to adjust the picture level in order to compensate for changes in the beam current.

The filament voltage is monitored for 'no' or 'excessive' voltage. This voltage is rectified by diode 6413 and fed to the emitter of transistor 7405. If this voltage goes above 6.8 V, transistor 7405 will conduct, making the 'EHT0' line 'high'. This will immediately switch off the horizontal drive (pin 30) via the slow stop procedure.

The horizontal drive signal exits IC7200 at pin 30 and goes to 7401, the horizontal driver transistor. The signal is amplified and coupled to the base circuit of 7402, the horizontal output transistor. This will drive the line output transformer (LOT) and associated circuit. The LOT provides the extra high voltage (EHT), the VG2 voltage and the focus and filament voltages for the CRT, while the line output circuit drives the horizontal deflection coil.

9.5.2 Vertical Drive

A divider circuit performs the vertical synchronisation. The vertical ramp generator needs an external resistor (R3245, pin 20) and capacitor (C2244, pin 21). A differential output is available at pins 16 and 17, which are DC-coupled with the vertical output stage.
To avoid damage of the picture tube when the vertical deflection fails, the 'V_GUARD' output is fed to the beam current limiting input. When a failure is detected, the RGB-outputs are blanked. When no vertical deflection output stage is connected, this guard circuit will also blank the output signals.

These 'V_DRIVE+' and 'V_DRIVE-' signals are applied to the input pins 7 and 1 of IC7471 (vertical deflection amplifier). These are voltage driven differential inputs. As the driver device (IC7200) delivers output currents, R3474 and R3479 convert them to voltage. The differential input voltage is compared with the voltage across measuring resistor R3471 that provides internal feedback information. The voltage across this measuring resistor is proportional to the output current, which is available at pin 5 where it drives the vertical deflection coil (connector 0222).
IC7471 is supplied by +/-13 V. The vertical flyback voltage is generated at pin 3.

9.6 Power Supply

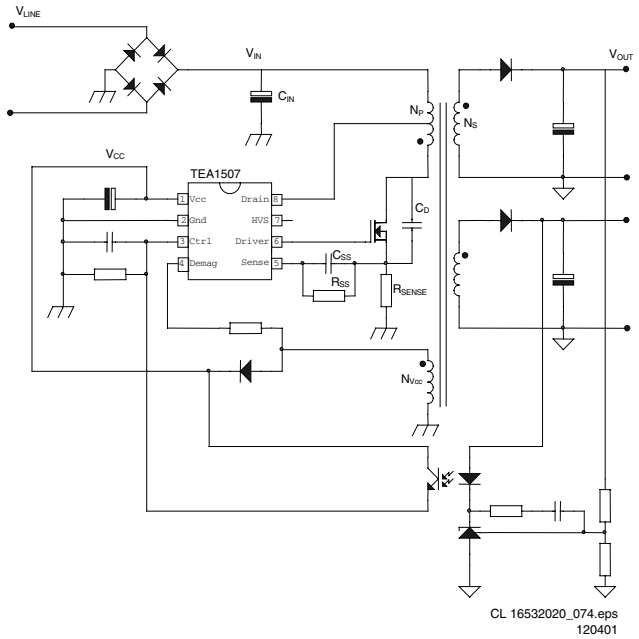


Figure 9-6

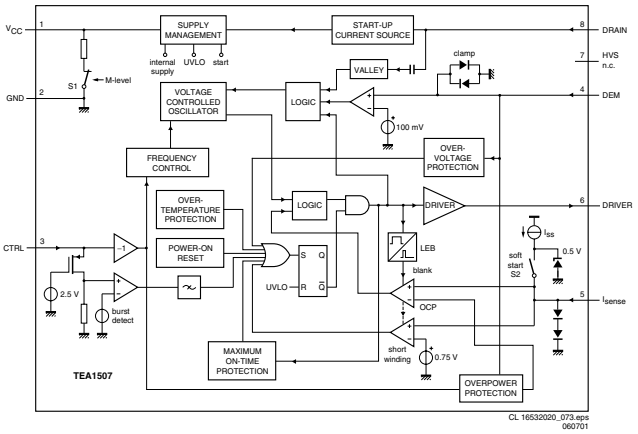


Figure 9-7

9.6.1 Introduction

The supply is a Switching Mode Power Supply (SMPS). The frequency of operation varies with the circuit load. This 'Quasi-Resonant Flyback' behaviour has some important benefits compared to a 'hard switching' fixed frequency Flyback converter. The efficiency can be improved up to 90%, which results in lower power consumption. Moreover the supply runs cooler and safety is enhanced.
The power supply starts operating when a DC voltage goes from the rectifier bridge via T5520, R3532 to pin 8. The operating voltage for the driver circuit is also taken from the 'hot' side of this transformer.
The switching regulator IC7520 starts switching the FET 'on' and 'off', to control the current flow through the primary winding of transformer 5520. The energy stored in the primary winding during the 'on' time is delivered to the secondary windings during the 'off' time.
The 'MainSupply' line is the reference voltage for the power supply. It is sampled by resistors 3543 and 3544 and fed to the input of the regulator 7540/6540. This regulator drives the feedback optocoupler 7515 to set the feedback control voltage on pin 3 of 7520.
The power supply in the set is 'on' any time AC power goes to the set.

Derived Voltages
The voltages supplied by the secondary windings of T5520 are:
- 'MainAux' for the audio circuit (voltage depends on set execution, see table below),
- 3.3 V and 3.9 V for the microprocessor and
- 'MainSupply' for the horizontal output (voltage depends on set execution, see table below).

Other supply voltages are provided by the LOT. It supplies +50 V (only for large screen sets), +13 V, +8 V, +5 V and a +200 V source for the video drive. The secondary voltages of the LOT are monitored by the 'EHTinformation' lines. These lines are fed to the video processor part of the UOC IC7200 on pins 11 and 34.
This circuit will shut 'off' the horizontal drive in case of over-voltage or excessive beam current.

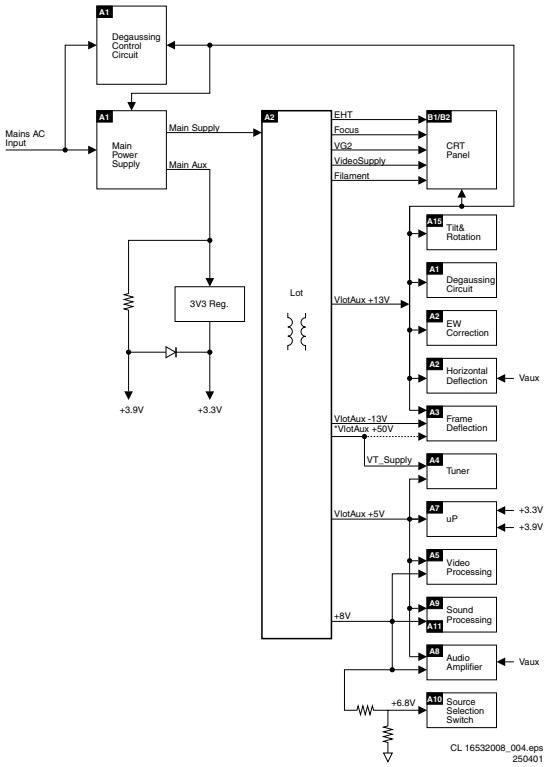


Figure 9-8

Power supply voltages L01				
Screen Size	**Voltage name**	**Meas. point**	**Value**	**Remark**
14", 17", 20", 21"	MainSupply	P6 (C2561)	95 V	
	MainAux	P5 (C2564)	11 V	Stereo 2x3 W and Mono 1x2 W, 3 W, 4 W
			10 V	Stereo 2x1 W and Mono 1x1 W
All others	MainSupply	P6 (C2561)	130 V	21/25/29RF and 25/27/32/35V
			143 V	25/28/29SF, 25/28BLD, 25/28BLS, 28/32WS, 24/28BLDWS & BLSWS
	MainAux	P5 (C2564)	12 V	Stereo 2x1 W, 3 W, 5 W
			10 V	Mono 1x1 W

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Figure 9-9

Degaussing

When the set is switched on, the degaussing relay 1515 is immediately activated as transistor 7580 is conducting. Due to the RC-time of R3580 and C2580, it will last about 3 to 4 seconds before transistor 7580 is switched off.

9.6.2 Basic IC Functionality

For a clear understanding of the Quasi-Resonant behaviour, it is possible to explain it by a simplified circuit diagram (see Figure below). In this circuit diagram, the secondary side is transferred to the primary side and the transformer is replaced by an inductance L_P. C_D is the total drain capacitance including the resonance capacitor C_R, parasitic output capacitor C_{OSS} of the MOSFET and the winding capacitance C_W of the transformer. The turns ratio of the transformer is represented by n (N_P/N_S).

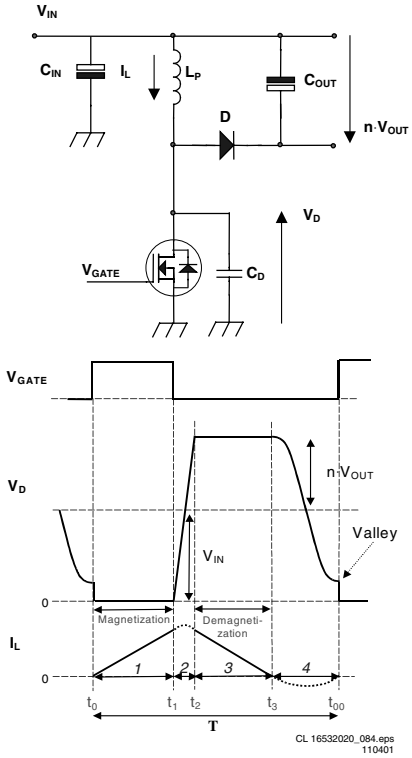


Figure 9-10

In the Quasi-Resonant mode each period can be divided into four different time intervals, in chronological order:

- Interval 1: t0 < t < t1 primary stroke At the beginning of the first interval, the MOSFET is switched 'on' and energy is stored in the primary inductance (magnetisation). At the end, the MOSFET is switched 'off' and the second interval starts.
- Interval 2: t1 < t < t2 commutation time In the second interval, the drain voltage will rise from almost zero to $V_{IN}+n\bullet(V_{OUT}+V_F)$. V_F is the forward voltage drop of de diode that will be omitted from the equations from now on. The current will change its positive derivative, corresponding to V_{IN}/L_P, to a negative derivative, corresponding to $-n\bullet V_{OUT}/L_P$.
- Interval 3: t2 < t < t3 secondary stroke In the third interval, the stored energy is transferred to the output, so the diode starts to conduct and the inductive current I_L will decrease. In other words, the transformer will be demagnetised. When the inductive current has become zero the next interval begins.
- Interval 4: t3 < t < t00 resonance time In the fourth interval, the energy stored in the drain capacitor C_D will start to resonate with the inductance L_P. The voltage and current waveforms are sinusoidal waveforms. The drain voltage will drop from $V_{IN}+n\bullet V_{OUT}$ to $V_{IN}-n\bullet V_{OUT}$.

Frequency Behaviour

The frequency in the QR-mode is determined by the power stage and is not influenced by the controller (important parameters are L_P and C_D). The frequency varies with the input voltage V_{IN} and the output power P_{OUT}. If the required output power increases, more energy has to be stored in the transformer. This leads to longer magnetising t_{PRIM} and demagnetising t_{SEC} times, which will decrease the frequency. See the frequency versus output power characteristics below. The frequency characteristic is not only output power-, but also input voltage dependent. The higher the input voltage, the smaller t_{PRIM}, so the higher the frequency will be.

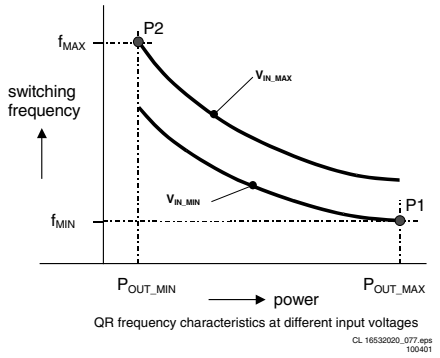


Figure 9-11

Point P1 is the minimum frequency f_{MIN} that occurs at the specified minimum input voltage and maximum output power required by the application. Of course the minimum frequency has to be chosen above the audible limit (>20 kHz).

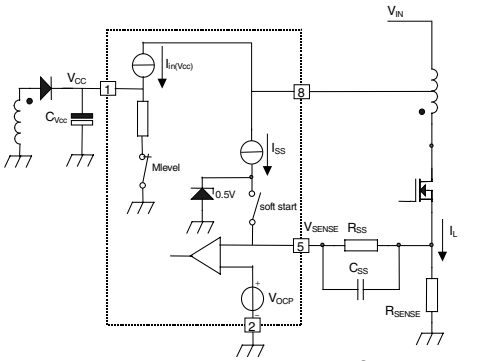
Start-up Sequence

When the rectified AC voltage V_{IN} (via the centre tap connected to pin 8) reaches the Mains dependent operation level (Mlevel: between 60 and 100 V), the internal 'Mlevel switch' will be opened and the start-up current source is enabled to charge capacitor C2521 at the V_{CC} pin as shown below.

The 'soft start' switch is closed when the V_{CC} reaches a level of 7 V and the 'soft start' capacitor C_{SS} (C2522, between pin 5 and the sense resistor R3526), is charged to 0.5 V.

Once the V_{CC} capacitor is charged to the start-up voltage $V_{CC\text{-}start}$ (11 V), the IC starts driving the MOSFET. Both internal current sources are switched 'off' after reaching this start-up voltage. Resistor R_{SS} (3524) will discharge the 'soft start' capacitor, such that the peak current will slowly increase. This to prevent 'transformer rattle'.

During start-up, the V_{CC} capacitor will be discharged until the moment that the primary auxiliary winding takes over this voltage.



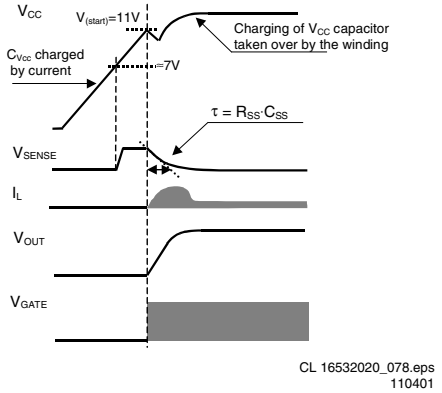


Figure 9-12

The moment that the voltage on pin 1 drops below the 'under voltage lock out' level (UVLO = ± 9 V), the IC will stop switching and will enter a safe restart from the rectified mains voltage.

Operation

The supply can run in three different modes depending on the output power:

- Quasi-Resonant mode (QR) The QR mode, described above, is used during normal operation. This will give a high efficiency.
- Frequency Reduction mode (FR) The FR mode (also called VCO mode) is implemented to decrease the switching losses at low output loads. In this way the efficiency at low output powers is increased, which enables power consumption smaller than 3 W during stand-by. The voltage at the pin 3 (Ctrl) determines where the frequency reduction starts. An external Ctrl voltage of 1.425 V corresponds with an internal VCO level of 75 mV. This fixed VCO level is called $V_{VCO,start}$. The frequency will be reduced in relation to the VCO voltage between 75 mV and 50 mV (at levels larger than 75 mV, Ctrl voltage < 1.425V, the oscillator will run on maximum frequency f_{oscH} = 175 kHz typically). At 50 mV ($V_{VCO,max}$) the frequency is reduced to the minimum level of 6 kHz. Valley switching is still active in this mode.
- Minimum Frequency mode (MinF) At VCO levels below 50 mV, the minimum frequency will remain on 6 kHz, which is called the MinF mode. Because of this low frequency, it is possible to run at very low loads without having any output regulation problems.

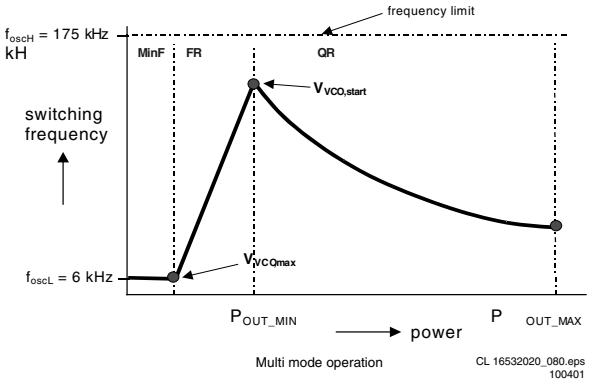


Figure 9-13

Safe-Restart Mode

This mode is introduced to prevent the components from being destroyed during eventual system fault conditions. It is also used for the Burst mode. The Safe-Restart mode will be entered if it is triggered by one of the following functions:

- Over voltage protection,
- Short winding protection,
- Maximum 'on time' protection,
- V_{CC} reaching UVLO level (fold back during overload),
- Detecting a pulse for Burst mode,
- Over temperature protection.

When entering the Safe-Restart mode, the output driver is immediately disabled and latched. The V_{CC} winding will not charge the V_{CC} capacitor anymore and the V_{CC} voltage will drop until UVLO is reached. To recharge the V_{CC} capacitor, the internal current source ($I_{(restart)(VCC)}$) will be switched 'on' to initiate a new start-up sequence as described before. This Safe-Restart mode will persist until the controller detects no faults or burst triggers.

Standby

The set goes to Standby in the following cases:

- After pressing the 'standby' key on the remote control.
- When the set is in protection mode.

In Standby, the power supply works in 'burst mode'.
Burst mode can be used to reduce the power consumption below 1 W at stand-by. During this mode, the controller is active (generating gate pulses) for only a short time and for a longer time inactive waiting for the next burst cycle.
In the active period the energy is transferred to the secondary and stored in the buffer capacitor C_{STAB} in front of the linear stabiliser (see Figure below). During the inactive period, the load (e.g. microprocessor) discharges this capacitor. In this mode, the controller makes use of the Safe-Restart mode.

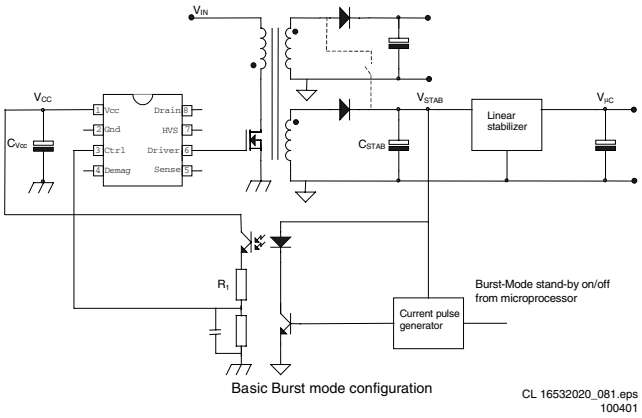


Figure 9-14

The system enters burst mode standby when the microprocessor activates the 'Stdby_con' line. When this line is pulled high, the base of TS7541 is allowed to go high. This is triggered by the current from collector TS7542. When TS7541 turns 'on', the opto-coupler (7515) is activated, sending a large current signal to pin 3 (Ctrl). In response to this signal, the IC stops switching and enters a 'hiccup' mode. This burst activation signal should be present for longer than the 'burst blank' period (typically 30 μs): the blanking time prevents false burst triggering due to spikes.
Burst mode standby operation continues until the microcontroller pulls the 'Stdby_con' signal low again. The base of TS7541 is unable to go high, thus cannot turn 'on'. This will disable the burst mode. The system then enters the start-up sequence and begins normal switching behaviour.

For a more detailed description of one burst cycle, three time intervals are defined:

- t1: Discharge of V_{CC} when gate drive is active During the first interval, energy is transferred, which result in a ramp-up of the output voltage (V_{STAB}) in front of the stabiliser. When enough energy is stored in the capacitor, the IC will be switched 'off' by a current pulse generated at the secondary side. This pulse is transferred to the primary side via the opto coupler. The controller will disable the output driver (safe restart mode) when the current pulse reaches a threshold level of 16 mA into the Ctrl pin. A resistor R_1 (R3519) is placed in series with the opto coupler, to limit the current going into the Ctrl pin. Meanwhile the V_{CC} capacitor is discharged but has to stay above V_{UVLO} .
- t2: Discharge of V_{CC} when gate drive is inactive During the second interval, the V_{CC} is discharged to V_{UVLO}. The output voltage will decrease depending on the load.
- t3: Charge of V_{CC} when gate drive is inactive The third interval starts when the UVLO is reached. The internal current source charges the V_{CC} capacitor (also the soft start capacitor is recharged). Once the V_{CC} capacitor is charged to the start-up voltage, the driver is activated and a new burst cycle is started.

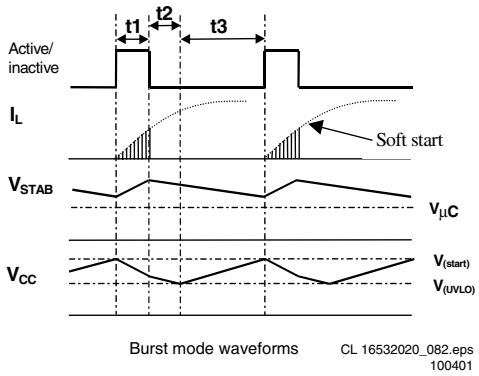


Figure 9-15

9.6.3 Protection Events

The SMPS IC7520 has the following protection features:

Demagnetisation sense
This feature guarantees discontinuous conduction mode operation in every situation. The oscillator will not start a new primary stroke until the secondary stroke has ended. This is to ensure that FET 7521 will not turn on until the demagnetisation of transformer 5520 is completed. The function is an additional protection feature against:

- saturation of the transformer,
- damage of the components during initial start-up,
- an overload of the output.

The demag(netisation) sense is realised by an internal circuit that guards the voltage (Vdemag) at pin 4 that is connected to V_{CC} winding by resistor R_1 (R3522). The Figure below shows the circuit and the idealised waveforms across this winding.

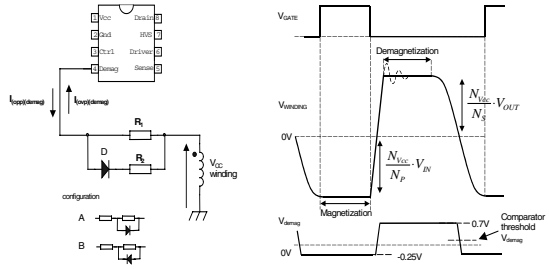


Figure 9-16

Over Voltage Protection
The Over Voltage Protection ensures that the output voltage will remain below an adjustable level. This works by sensing the auxiliary voltage via the current flowing into pin 4 (DEM) during the secondary stroke. This voltage is a well-defined replica of the output voltage. Any voltage spikes are averaged by an internal filter.
If the output voltage exceeds the OVP trip level, the OVP circuit switches the power MOSFET 'off'.
Next, the controller waits until the 'under voltage lock out' level (UVLO = ± 9 V) is reached on pin 1 (V_{CC}). This is followed by a safe restart cycle, after which switching starts again. This process is repeated as long as the OVP condition exists. The output voltage, at which the OVP function trips, is set by the demagnetisation resistor R3522.

Over Current Protection
The internal OCP protection circuit limits the 'sense' voltage on pin 5 to an internal level.

Over Power Protection
During the primary stroke, the rectified AC input voltage is measured by sensing the current drawn from pin 4 (DEM). This current is dependent on the voltage on pin 9 of transformer 5520 and the value of R3522. The current information is used to adjust the peak drain current, which is measured via pin I_{SENSE}.

Short Winding Protection
If the 'sense' voltage on pin 5 exceeds the short winding protection voltage (0.75 V), the converter will stop switching. Once V_{CC} drops below the UVLO level, capacitor C2521 will be recharged and the supply will start again. This cycle will be repeated until the short circuit is removed (safe restart mode). The short winding protection will also protect in case of a secondary diode short circuit.
This protection circuit is activated after the leading edge blanking time (LEB).

LEB time
The LEB (Leading Edge Blanking) time is an internally fixed delay, preventing false triggering of the comparator due to current spikes. This delay determines the minimum 'on' time of the controller.

Over Temperature protection
When the junction temperature exceeds the thermal shutdown temperature (typ. 140º C), the IC will disable the driver. When the V_{CC} voltage drops to UVLO, the V_{CC} capacitor will be recharged to the $V_{(start)}$ level. If the temperature is still too high, the V_{CC} voltage will drop again to the UVLO level (Safe-Restart mode). This mode will persist until the junction temperature drops 8 degrees typically below the shutdown temperature.

Mains dependent operation enabling level
To prevent the supply from starting at a low input voltage, which could cause audible noise, a mains detection is implemented (Mlevel). This detection is provided via pin 8, that detects the minimum start-up voltage between 60 and 100 V. As previous mentioned, the controller is enabled between 60 and 100 V. An additional advantage of this function is the protection against a disconnected buffer capacitor (C_{IN}). In this case, the supply will not be able to start-up because the V_{CC} capacitor will not be charged to the start-up voltage.

9.7 Control

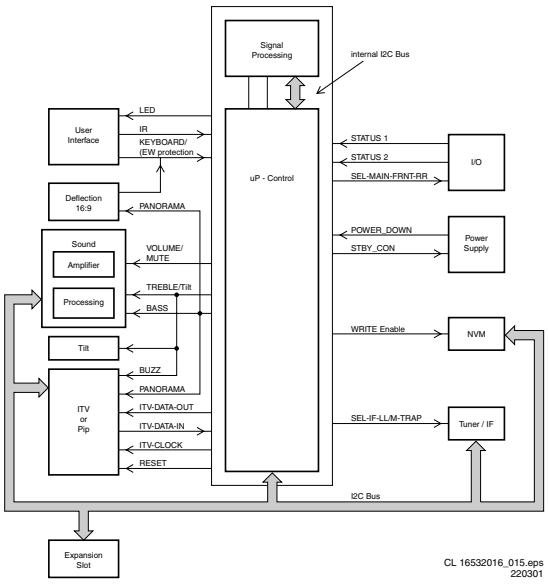


Figure 9-17

9.7.1 Introduction

The microprocessor part of the UOC has the complete control and teletext on board. User menu, Service Default Mode, Service Alignment Mode and Customer Service Mode are generated by the μP. Communication to other ICs is done via the I^2C-bus.

9.7.2 I^2C-Bus

The main control system, which consists of the microprocessor part of the UOC (7200), is linked to the external devices (tuner, NVM, MSP, etc) by means of the I^2C-bus. An internal I^2C-bus is used to control other signal processing functions, like video processing, sound IF, vision IF, synchronisation, etc.

9.7.3 User Interface

There are two control signals, called 'KEYBOARD_protn' and 'IR'. Users can interact either through the Remote Control transmitter, or by activation of the appropriate keyboard buttons.
The L01 uses a remote control with RC5 protocol. The incoming signal is connected to pin 67 of the UOC.
The 'Top Control' keyboard, connected to UOC pin 80, can also control the set. Button recognition is done via a voltage divider. The 'KEYBOARD_protn' line, also serves to detect faults in the E/W circuit, which would require the μP to shut down the set (by forcing the power supply in standby mode).

The front LED (6691) is connected to an output control line of the microprocessor (pin 5). It is activated to provide the user information about whether or not the set is working correctly (e.g., responding to the remote control or fault condition)

9.7.4 Sound Interface

There are three control signals, called 'Volume_Mute', 'Treble_Buzzer_Hosp_app' and 'Bass_panorama'.
The 'Volume_Mute' line controls the sound level output of the audio amplifier or to mute it in case of no video identification or from user command. This line also controls the volume level during set switch 'on' and 'off' (to prevent audio plop).
The 'Treble' and 'Bass' lines have another functionality:
- The 'Bass_panorama' line is used to switch the panorama mode in widescreen sets (to fit 4:3 pictures into a 16:9 display, it is possible to apply a panoramic horizontal distortion, to make a screen-fitting picture without black sidebars or lost video).
- The 'Treble_Buzzer_Hosp_app' is used in ITV applications for other feautures, and in widescreen sets to enable the 'Tilt' feature (via R3172 on diagram A8) in the deflection part.

9.7.5 In- and Output Selection

For the control of the input and output selections, there are three lines:
- **STATUS1** This signal provides information to the microprocessor on whether a video signal is available on the SCART1 AV input and output port.
  - 0 to 2 V: INTERNAL 4:3
  - 4.5 to 7 V: EXTERNAL 16:9
  - 9.5 to 12 V: EXTERNAL 4:3
- **STATUS2** This signal provides information to the microprocessor on whether a video signal is available on the SCART2 AV input and output port (signal is low). For sets with an SVHS input, it provides the additional information if a Y/C or CVBS source is present (signal is high). The presence of an external Y/C source makes this line 'high' while a CVBS source makes the line 'low'.
  - 0 to 2 V: INTERNAL 4:3
  - 4.5 to 7 V: EXTERNAL 16:9

  - 9.5 to 12 V: EXTERNAL 4:3
- **SEL-MAIN-FRNT-RR** This is the 'source select control' signal from the microprocessor. This control line is under user control or can be activated by the other two control lines.

9.7.6 Power Supply Control

The microprocessor part is supplied with 3.3 V and 3.9 V both derived from the 'MainAux' voltage via a 3V3 stabiliser (7560) and a diode.
Two signals are used to control the power supply:

- **Stdby_con** This signal is generated by the microprocessor when over-current takes place at the 'MainAux' line. This is done to enable the power supply into standby burst mode, and to enable this mode during a protection. This signal is 'low' under normal operation conditions and goes to 'high' (3.3 V) under 'standby' and 'fault' conditions.
- **POWER_DOWN** This signal is generated by the power supply. Under normal operating conditions this signal is 'high' (3.3 V). During 'standby' mode, this signal is a pulse train of approx. 10 Hz and a 'high' duration of 5 ms. It is used to give information to the UOC about the fault condition in the Audio amplifier supply circuit. This information is generated by sensing the current on the 'MainAux' line (using voltage drop across R3564 to trigger TS7562). This signal goes 'low' when the DC-current on the 'MainAux' line exceeds 1.6 - 2.0 A. It is also used to give an early warning to the UOC about a power failure. Then the information is used to mute the sound amplifier to prevent a switch off noise and to solve the switch-off spot.

9.7.7 Tuner IF

Pin 3 of the UOC (SEL-IF-LL'_M-TRAP), is an output pin to switch the SAW-filter to the appropriate system.

- If UOC pin 3 is 'low', the selected system is:
  - West Europe: PAL B/G, I, SECAM L/L'
  - East Europe: PAL B/G
  - Asia Pacific: NTSC M
- If UOC pin 3 is 'high', the selected system is:
  - West Europe: SECAM L', L'-NICAM
  - East Europe: PAL D/K
  - Asia Pacific: PAL B/G, D/K, I

Note: For West Europe, two separate SAW filters (1002 and 1004) are used for video and audio (Quasi Split Sound demodulation). For East Europe, one SAW filter (1003) is used for both (Intercarrier demodulation).

9.7.8 Protection Events

Several protection events are controlled by the UOC:

- **BC protection**, to protect the picture tube from a too high beam current. The UOC has the capability of measuring the normal back level current during the vertical flyback. So if for some reason the CRT circuit is malfunctioning (i.e. high beam current), the normal black current will be out of the 75 μA range, and the UOC will trigger the power supply to shut down. However, this is a high beam-current situation, the TV screen will be bright white before the set is shut down.
- **I2C protection**, to check whether all I^2C IC's are functioning.

In case one of these protections is activated, the set will go into 'standby'. The 'on' and 'standby' LEDs are controlled via the UOC.

9.8 Abbreviation list

2CS	2 Carrier (or Channel) Stereo
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AFT	Automatic Fine Tuning
AGC	Automatic Gain Control: algorithm that controls the video input of the featurebox
AM	Amplitude Modulation
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ATS	Automatic Tuning System
AV	External Audio Video
AVL	Automatic Volume Level
BC-PROT	Beam Current Protection
BCL	Beam Current Limitation
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BLC-INFORMATION	Black current informationrmation
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
B-TXT	Blue teletext
CC	Closed Caption
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Colour Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronisation
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DBX	Dynamic Bass Expander
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFU	Direction For Use: description for the end user
DNR	Dynamic Noise Reduction
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EHT	Extra High Tension
EHT-INFORMATION	Extra High Tension informationrmation
EU	Europe
EW	East West, related to horizontal deflection of the set
EXT	External (source), entering the set via SCART or Cinch
FBL	Fast Blanking: DC signal accompanying RGB signals
FILAMENT	Filament of CRT
FLASH	Flash memory
FM	Field Memory
FM	Frequency Modulation
HA	Horizontal Acquisition: horizontal sync pulse coming out of the HIP

HFB	Horizontal Flyback Pulse: horizontal sync pulse from large signal deflection
HP	Headphone
Hue	Colour phase control for NTSC (not the same as 'Tint')
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I2C	Integrated IC bus
IF	Intermediate Frequency
IIC	Integrated IC bus
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.
ITV	Institutional TV
LATAM	Latin America
LED	Light Emitting Diode
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
LNA	Low Noise Amplifier
LS	Large Screen
LS	Loudspeaker
LSP	Large signal panel
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
MSP	Multistandard Sound Processor: ITT sound decoder
MUTE	Mute-Line
NC	Not Connected
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
NTSC	National Television Standard Committee. Colour system mainly used in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
OB	Option Byte
OC	Open Circuit
OSD	On Screen Display
PAL	Phase Alternating Line. Colour system mainly used in West Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)
PCB	Printed Circuit board
PIP	Picture In Picture
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
POR	Power-On Reset
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
PTP	Picture Tube Panel (or CRT-panel)
RAM	Random Access Memory
RC	Remote Control handset
RC5	Remote Control system 5, signal from the remote control receiver
RGB	Red Green Blue
ROM	Read Only Memory
SAM	Service Alignment Mode
SAP	Second Audio Program
SC	Sandcastle: pulse derived from sync signals
S/C	Short Circuit
SCAVEM	Scan Velocity Modulation
SCL	Serial Clock
SDA	Serial Data
SDM	Service Default Mode
SECAM	SEequence Couleur Avec Memoire. Colour system mainly used in France and East Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SS	Small Screen
STBY	Standby
SVHS	Super Video Home System
SW	Software
THD	Total Harmonic Distortion
TXT	Teletext
µP	Microprocessor
UOC	Ultimate One Chip
VA	Vertical Acquisition
VBAT	Main supply voltage for the deflection stage (mostly 141 V)
V-chip	Violence Chip
VCR	Video Cassette Recorder
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal
YC	Luminance (Y) and Chrominance (C) signal

10. Spare Parts List

Mono Carrier [A1-14]

Various

0127	4822 265 11253	FUSE HOLDER
0136	4822 492 70788	FIX IC
0138	4822 492 70788	FIX IC
0149	3104 311 02651	CABLE 9P
0152	3139 121 08841	CABLE 6P
0153	3104 301 09441	CABLE 3P
0154	3119 107 17611	CABLE 5P
0155	3119 107 17541	TREE ASSY SPEAKER
0157	3119 107 17461	CABLE 10P
0160	3119 107 17371	CABLE 6P/220/3P
0162	3119 107 17451	CABLE 7P/220/7P
0168	3119 107 17671	CABLE 4P/280/4P
0172	3104 311 03411	CABLE
0173	3104 311 04181	CABLE 5P/340/5P
0174	3119 107 17281	CABLE 6P/180/4P
0211	4822 265 20723	CABKE 2P3
0212	4822 267 10774	2P MALE
0217	2422 025 12482	CON 6P Male
0217	4822 267 10735	CON
0220	2422 025 04851	CON 3P
0221	4822 267 10966	CON 2P
0222	2422 025 10646	CON 2P Male
0227	2422 025 16383	CON
0229	4822 267 10735	B3B-EH-A
0231	2422 128 02972	SWITCH
0232	4822 267 31014	HEADPHONE SOCKET
0235	4822 267 60385	CON 21P
0236	2422 025 16382	CON 3P Male
0240	2422 025 11244	CON 7P Male
0242	2422 025 17042	CON 7P Male
0243	2422 025 04854	CON 6P Female
0246	4822 267 10734	B5B-EH-A
0246	4822 267 10735	B3B-EH-A
0251	4822 267 10565	4P
0259	2422 025 15848	CON 5P Male
0262	2422 025 16937	CON 3P Female
0265	4822 267 10748	3P
0285	4822 267 10676	1P
1000	2422 542 90111	TUN V+U PLL IEC
1000	3139 147 17401	TUNER UR1316R/A I -3
1002	4822 242 81436	OFWK3953M
1004	2422 549 44341	FILTER 38MHz OFWK9656M
1200	4822 242 81712	TPWA04B
1203	4822 242 70665	SFE10,7MS3-A
1500	2422 086 10914	FUSE 4A 250V
1600	4822 276 13775	SWITCH
1601	4822 276 13775	SWITCH
1602	4822 276 13775	SWITCH
1603	4822 276 13775	SWITCH
1660	2422 543 01203	Chrystal 12MHz
1831	4822 242 10769	Christal 18.432MHz

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2001	5322 122 32658	22pF 5% 50V
2002	5322 122 32658	22pF 5% 50V
2003	4822 122 33177	10nF 20% 50V
2004	4822 126 13751	47nF 10% 63V
2005	4822 124 40248	10µF 20% 63V
2006	4822 124 80791	470µF 20% 16V
2007	4822 126 14585	100nF 10% 50V
2008	4822 124 40207	100µF 20% 25V
2009	5322 122 32654	63V 22nF
2010	5322 126 10511	1nF 5% 50V
2101	4822 122 33172	390pF 5% 50V
2102	4822 122 33172	390pF 5% 50V
2103	2020 552 96305	4U7 20% 10V
2104	4822 122 33172	390pF 5% 50V
2105	4822 122 33172	390pF 5% 50V
2106	2020 552 96305	4U7 20% 10V
2107	4822 122 33172	390pF 5% 50V
2108	4822 122 33172	390pF 5% 50V
2109	2020 552 96305	4U7 20% 10V
2110	4822 122 33172	390pF 5% 50V
2111	4822 122 33172	390pF 5% 50V
2112	2020 552 96305	4U7 20% 10V
2113	5322 122 32658	22pF 5% 50V
2114	5322 122 32658	22pF 5% 50V
2115	5322 122 32658	22pF 5% 50V
2116	5322 122 32658	22pF 5% 50V
2117	5322 122 32658	22pF 5% 50V
2118	5322 122 32658	22pF 5% 50V
2120	5322 122 32658	22pF 5% 50V
2161	4822 124 12392	47µF 20% 16V
2201	4822 126 14585	100nF 10% 50V
2202	4822 126 14585	100nF 10% 50V
2203	4822 126 14585	100nF 10% 50V
2204	4822 126 14585	100nF 10% 50V
2205	4822 126 14076	220nF 25V
2206	4822 126 13693	56pF 1% 63V
2207	5322 126 10184	820P 5% 50V
2208	4822 126 14585	100nF 10% 50V
2209	4822 124 40769	4.7µF 20% 100V
2210	4822 124 41407	0.47µF 20% 63V
2211	4822 126 13482	470nF 20% 16V
2213	5322 122 32654	22nF 10% 63V
2214	5322 122 32654	22nF 10% 63V
2215	5322 122 32654	22nF 10% 63V
2216	4822 124 80791	470µF 20% 16V
2217	5322 122 32654	22nF 10% 63V
2219	4822 126 14076	220nF 25V
2221	4822 126 14585	100nF 10% 50V
2221	5322 122 32654	22nF 10% 63V
2222	4822 122 33177	10nF 20% 50V
2223	5322 122 32448	10pF 5% 63V
2225	4822 126 14076	220nF 25V
2226	5322 126 10465	3.9nF 10% 50V
2227	5322 126 10223	4.7nF 10% 63V
2228	5322 126 10184	820pF 5% 50V
2229	4822 124 40248	10µF 20% 63V
2230	4822 124 40769	4.7µF 20% 100V
2233	5322 126 10184	820pF 5% 50V
2234	4822 126 14585	100nF 10% 50V
2235	5322 122 32331	1nF 10% 100V
2238	5322 126 10511	1nF 5% 50V
2239	5322 126 10511	1nF 5% 50V
2240	5322 126 10511	1nF 5% 50V
2241	4822 126 13344	1.5nF 5% 63V
2242	4822 126 14043	1µF 20% 16V
2243	4822 122 33177	10nF 20% 50V
2244	5322 121 42386	100nF 5% 63V
2245	4822 126 14076	220nF 25V
2246	4822 124 40769	4.7µF 20% 100V
2247	4822 124 80791	470µF 20% 16V
2248	5322 122 32654	22nF 10% 63V
2249	5322 122 32654	22nF 10% 63V
2250	4822 124 22652	2.2µF 20% 50V
2252	5322 126 10511	1nF 5% 50V
2253	5322 126 10511	1nF 5% 50V
2254	4822 051 20008	JUMPER
2254	5322 122 32531	100pF 5% 50V
2400	4822 121 43901	4.7nF 5% 50V
2400	4822 121 51655	47nF 50V
2404	2022 333 00167	560nF 5% 250V
2404	4822 121 10518	390nF 5% 250V
2404	4822 121 10781	470nF 5% 250V
2405	5322 126 10511	1nF 5% 50V
2407	4822 121 70434	11nF 5% 1.6KV
2407	4822 121 70649	9.1nF 5% 1.6KV
2408	4822 122 30103	22nF 80% 63V
2408	4822 122 33449	47nF 30% 50V
2409	4822 124 11575	47µF 20% 160V
2410	2020 021 91577	470µF 20% 16V
2411	5322 121 10472	47µF 25V
2412	2222 347 90236	33nF 10% 100V
2413	4822 124 11565	10µF 20% 250V
2414	4822 124 81145	1000µF 20% 16V
2415	5322 122 32531	100pF 5% 50V
2416	4822 126 12239	560pF 10% 2KV
2416	4822 126 12263	220pF 10% 1KV
2416	4822 126 14237	470pF 10% 2KV
2417	4822 124 81145	1000µF 20% 16V
2418	4822 122 33177	10nF 20% 50V
2419	4822 124 22776	1µF 50V
2420	4822 124 21913	1µF 20% 63V
2421	4822 126 13751	47nF 10% 63V
2422	2020 021 91577	470µF 20% 16V
2423	4822 124 42127	10µF 20% 100V
2424	4822 121 43526	47nF 5% 250V
2424	5322 121 42465	68nF 5% 63V
2471	5322 121 42386	100nF 5% 63V
2472	5322 121 42386	100nF 5% 63V
2473	4822 124 40255	100µF 20% 63V
2475	5322 122 32268	470P 5% 63V
2476	4822 121 42408	220nF 5% 63V
2477	5322 122 32268	470P 5% 63V
2500	4822 126 13589	470nF 275V
2501	4822 126 14153	2.2nF 10% 1KV
2502	4822 126 14153	2.2nF 10% 1KV
2503	4822 124 12439	100µF 20% 400V
2505	4822 126 14153	2.2nF 10% 1KV
2506	4822 126 14153	2.2nF 10% 1KV
2508	4822 122 50116	470pF 10% 1KV
2515	4822 126 14049	1.5nF 20% 250V
2516	4822 126 13867	330P 20% 250V
2520	4822 126 14585	100nF 10% 50V
2521	4822 124 41751	47µF 20% 50V
2522	4822 126 14585	100nF 10% 50V
2523	4822 126 13862	1.5nF 10% 2KV
2525	5322 122 34099	470pF 10% 63V
2526	5322 122 31647	1nF 10% 63V
2527	5322 122 34099	470pF 10% 63V
2540	4822 126 13188	15nF 5% 63V
2560	4822 126 13449	1nF 10% 2KV
2561	4822 124 42336	47µF 20% 160V
2562	5322 122 32331	1nF 10% 100V
2563	5322 121 42386	100nF 5% 63V
2564	2020 012 93057	2200µF 20% 16V
2565	4822 122 50116	470pF 10% 1KV
2566	4822 124 40433	47µF 20% 25V
2567	4822 124 40433	47µF 20% 25V
2569	5322 122 34099	470pF 10% 63V
2601	4822 126 14076	220nF 25V
2602	5322 122 32531	100pF 5% 50V
2606	5322 126 10511	1nF 5% 50V
2607	5322 122 32659	33pF 5% 50V
2608	4822 126 14043	1µF 20% 16V
2609	5322 122 32659	33pF 5% 50V
2611	4822 126 14043	1µF 20% 16V
2612	4822 126 13694	68pF 1% 63V
2613	4822 126 13694	68pF 1% 63V
2615	5322 126 10511	1nF 5% 50V
2616	4822 126 13482	470nF 20% 16V
2618	4822 126 14043	1µF 20% 16V
2619	4822 126 14043	1µF 20% 16V
2691	4822 124 40207	100µF 20% 25V
2801	4822 124 81151	22µF 50V
2804	2020 552 96305	4U7 20% 10V
2805	2020 552 96305	4U7 20% 10V
2831	5322 122 32447	1pF 5% 63V
2832	5322 122 32447	1pF 5% 63V
2833	4822 126 13692	47pF 1% 63V
2834	5322 122 32268	63V 470P 5%
2835	4822 122 33575	220pF 5% 63V
2836	4822 126 13344	1.5nF 5% 63V
2837	4822 124 40769	4.7µF 20% 100V
2838	4822 126 13692	47pF 1% 63V
2839	4822 126 13692	47pF 1% 63V
2840	4822 126 14585	100nF 10% 50V
2841	4822 124 40248	10µF 20% 63V
2842	4822 126 14585	100nF 10% 50V
2843	4822 124 40248	10µF 20% 63V
2844	4822 124 40248	10µF 20% 63V
2845	4822 126 14585	100nF 10% 50V
2846	4822 124 40207	100µF 20% 25V
2849	5322 126 10511	1nF 5% 50V
2850	5322 126 10511	1nF 5% 50V
2851	2020 552 96305	4U7 20% 10V
2852	5322 126 10511	1nF 5% 50V
2853	2020 552 96305	4U7 20% 10V
2854	5322 126 10511	1nF 5% 50V
2855	4822 122 30045	27pF 2% 100V
2856	4822 126 13486	15pF 2% 63V
2857	5322 122 33538	150pF 2% 63V
2858	5322 126 10511	1nF 5% 50V
2859	5322 126 10511	1nF 5% 50V
2860	4822 126 13695	82pF 1% 63V
2887	4822 122 33177	10nF 20% 50V
2894	4822 122 33575	220pF 5% 63V
2895	5322 116 80853	560pF 5% 63V
2897	4822 122 33172	390pF 5% 50V
2898	4822 122 33177	10nF 20% 50V
2902	4822 124 81144	1000µF 16V
2903	4822 124 21913	1µF 20% 63V
2904	4822 126 13482	470nF 20% 16V
2904	4822 126 14043	1µF 20% 16V
2905	5322 126 10511	1nF 5% 50V
2906	4822 126 13482	470nF 20% 16V
2907	5322 126 10511	1nF 5% 50V
2908	4822 124 40248	10µF 20% 63V
2941	4822 124 40248	10µF 20% 63V
2950	5322 122 31863	330pF 5% 63V
2981	4822 124 40248	10µF 20% 63V
2982	5322 122 32268	470P 5% 63V
2983	4822 124 40248	10µF 20% 63V
2984	5322 122 32268	470P 5% 63V

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3000	4822 116 52175	100Ω 5% 0.5W
3001	4822 116 52175	100Ω 5% 0.5W

3002	4822 117 10833	10k 1% 0.1W
3003	4822 117 11139	1k5 1% 0.1W
3005	4822 116 52175	100Ω 5% 0.5W
3006	4822 117 11449	2k2 5% 0.1W
3007	4822 117 11507	6k8 1% 0.1W
3008	4822 117 11449	2k2 5% 0.1W
3010	4822 051 20008	jumper
3010	4822 117 13577	330Ω 1% 1.25W
3011	4822 117 13577	330Ω 1% 1.25W
3101	4822 116 83868	150Ω 5% 0.5W
3102	3198 021 52240	220k 5%
3103	4822 116 83868	150Ω 5% 0.5W
3104	4822 117 10834	47k 1% 0.1W
3105	4822 116 83868	150Ω 5% 0.5W
3106	3198 021 52240	220k 5%
3107	4822 116 83868	150Ω 5% 0.5W
3108	4822 117 10834	47k 1% 0.1W
3109	4822 116 52201	75Ω 5% 0.5W
3110	4822 116 52228	680Ω 5% 0.5W
3111	4822 116 52264	27k 5% 0.5W
3112	4822 117 11507	6k8 1% 0.1W
3113	4822 116 52201	75Ω 5% 0.5W
3114	4822 116 52228	680Ω 5% 0.5W
3115	4822 116 52201	75Ω 5% 0.5W
3116	4822 116 52228	680Ω 5% 0.5W
3117	4822 116 52201	75Ω 5% 0.5W
3118	4822 116 52175	100Ω 5% 0.5W
3119	4822 116 52199	68Ω 5% 0.5W
3120	4822 051 10102	1k 2% 0.25W
3121	4822 116 52201	75Ω 5% 0.5W
3122	4822 116 52176	10Ω 5% 0.5W
3155	4822 116 52195	47Ω 5% 0.5W
3200	4822 116 83881	390Ω 5% 0.5W
3201	4822 116 52175	100Ω 5% 0.5W
3202	4822 116 52175	100Ω 5% 0.5W
3203	4822 116 52175	100Ω 5% 0.5W
3204	4822 050 21003	10k 1% 0.6W
3206	4822 117 10837	100k 1% 0.1W
3207	4822 050 11002	1k 1% 0.4W
3208	4822 117 11503	220Ω 1% 0.1W
3209	4822 117 12521	68Ω 1% 0.1W
3212	4822 051 20471	470Ω 5% 0.1W
3213	4822 051 20561	560Ω 5% 0.1W
3214	4822 116 52175	100Ω 5% 0.5W
3217	4822 051 20334	330k 5% 0.1W
3218	4822 117 11149	82k 1% 0.1W
3219	4822 117 11449	2k2 5% 0.1W
3223	4822 117 11373	100Ω 1%
3226	4822 051 20561	560Ω 5% 0.1W
3227	4822 117 10837	100k 1% 0.1W
3228	4822 116 52234	100k 5% 0.5W
3229	4822 117 11454	820Ω 1% 0.1W
3230	4822 051 10102	1k 2% 0.25W
3230	4822 117 11504	270Ω 1% 0.1W
3231	4822 051 20008	jumper
3231	4822 051 20561	560Ω 5% 0.1W
3232	4822 117 11449	2k2 5% 0.1W
3233	4822 117 11454	820Ω 1% 0.1W
3234	4822 117 10361	680Ω 1% 0.1W
3235	4822 116 52175	100Ω 5% 0.5W
3236	4822 051 20154	150k 5% 0.1W
3236	4822 117 10837	100k 1% 0.1W
3237	4822 051 20122	1k2 5% 0.1W
3237	4822 117 13577	330Ω 1% 1.25W
3238	4822 051 20561	560Ω 5% 0.1W
3238	4822 117 11504	270Ω 1% 0.1W
3239	4822 117 11504	270Ω 1% 0.1W
3239	4822 117 13577	330Ω 1% 1.25W
3240	4822 117 10837	100k 1% 0.1W
3241	4822 051 20223	22k 5% 0.1W
3242	4822 117 11383	12k 1% 0.1W
3244	4822 116 52231	820Ω 5% 0.5W
3245	4822 051 20393	39k 5% 0.1W
3246	4822 117 10833	10k 1% 0.1W
3247	3198 021 52240	220k 5%
3248	4822 051 20273	27k 5% 0.1W
3249	4822 116 52231	820Ω 5% 0.5W
3251	4822 116 52175	100Ω 5% 0.5W
3254	4822 051 20105	1M 5% 0.1W
3256	4822 051 10102	1k 2% 0.25W
3257	4822 051 20106	10M 5% 0.1W
3258	4822 051 20334	330k 5% 0.1W
3259	4822 051 20474	470k 5% 0.1W
3261	4822 117 13577	330Ω 1% 1.25W
3403	4822 053 12229	22Ω 5% 3W
3404	4822 052 10688	6Ω8 5% 0.33W
3405	4822 117 11824	2k2 5%
3406	4822 050 21003	10k 1% 0.6W
3408	4822 116 52303	8k2 5% 0.5W
3410	4822 051 20333	33k 5% 0.1W
3411	4822 052 10109	10Ω 5% 0.33W
3412	4822 050 23903	39k 1% 0.6W
3413	4822 117 10833	10k 1% 0.1W
3414	4822 050 21203	12k 1% 0.6W
3415	4822 050 11002	1k 1% 0.4W
3416	4822 052 11398	3Ω9 5% 0.5W
3417	4822 050 23303	33k 1% 0.6W
3418	4822 051 20333	33k 5% 0.1W
3419	4822 117 11507	6k8 1% 0.1W
3420	4822 051 20333	33k 5% 0.1W
3421	4822 053 11688	6Ω8 5% 2W
3422	4822 117 11373	100Ω 1%
3423	4822 117 11454	820Ω 1% 0.1W
3424	4822 116 52175	100Ω 5% 0.5W
3425	4822 116 52238	12k 5% 0.5W
3425	4822 116 52251	18k 5% 0.5W
3426	4822 051 20105	1M 5% 0.1W
3427	4822 116 52238	12k 5% 0.5W
3428	4822 052 11399	39Ω 5% 0.5W
3429	4822 116 52269	3k3 5% 0.5W
3430	4822 116 52244	15k 5% 0.5W
3431	4822 051 10102	1k 2% 0.25W
3431	4822 051 20562	5k6 5% 0.1W
3431	4822 117 11373	100Ω 1%
3432	4822 116 52186	22Ω 5% 0.5W
3435	4822 100 12159	100k 30%
3436	4822 052 10478	4Ω7 5% 0.33W
3471	4822 050 23308	3Ω3 1% 0.6W
3471	4822 050 23908	3Ω9 1% 0.6W
3471	4822 050 24708	4Ω7 1% 0.6W
3472	4822 050 23908	3Ω9 1% 0.6W
3472	4822 050 25608	5Ω6 1% 0.6W
3472	4822 050 26808	6Ω8 1% 0.6W
3473	4822 050 22202	2k2 1% 0.6W
3474	4822 050 11002	1k 1% 0.4W
3475	4822 050 22202	2k2 1% 0.6W
3476	4822 052 10158	1Ω5 5% 0.33W
3477	4822 116 83872	220Ω 5% 0.5W
3478	4822 116 83872	220Ω 5% 0.5W
3479	4822 050 11002	1k 1% 0.4W
3500	4822 053 21335	3M3 5% 0.5W
3501	4822 053 21335	3M3 5% 0.5W
3504	2120 660 90043	PTC 9Ω 200V 100R
3506	4822 116 83872	220Ω 5% 0.5W
3507	4822 252 11215	DSP301N-A21F
3519	4822 116 83876	270Ω 5% 0.5W
3520	4822 051 20122	1k2 5% 0.1W
3521	4822 050 24708	4Ω7 1% 0.6W
3521	4822 116 52186	22Ω 5% 0.5W
3522	4822 051 20334	330k 5% 0.1W
3523	4822 052 10101	100Ω 5% 0.33W
3523	4822 052 10479	47Ω 5% 0.33W
3524	4822 117 11148	56k 1% 0.1W
3525	4822 051 10102	1k 2% 0.25W
3526	2120 106 90636	MTL 1W 0Ω18 5%
3526	3198 012 11570	1W 0Ω15 5%
3527	4822 052 10222	2k2 5% 0.33W
3528	4822 117 10833	10k 1% 0.1W
3529	4822 117 10834	47k 1% 0.1W
3530	4822 051 20472	4k7 5% 0.1W
3531	4822 051 20008	jumper
3541	4822 051 20471	470Ω 5% 0.1W
3542	4822 117 11139	1k5 1% 0.1W
3543	4822 050 28203	82k 1% 0.6W
3544	4822 050 26802	6k8 1% 0.6W
3545	4822 117 11149	82k 1% 0.1W
3547	4822 117 11342	0Ω33 5% 2W
3548	4822 051 20822	8k2 5% 0.1W
3549	4822 116 83872	220Ω 5% 0.5W
3550	4822 053 12103	10k 5% 3W
3558	4822 053 10331	330Ω 5% 1W
3560	4822 116 52195	47Ω 5% 0.5W
3561	4822 116 83872	220Ω 5% 0.5W
3562	4822 117 10833	10k 1% 0.1W
3563	4822 051 20822	8k2 5% 0.1W
3564	3198 012 21070	2W 0Ω1 100%
3567	4822 117 11449	2k2 5% 0.1W
3568	4822 051 20822	8k2 5% 0.1W
3603	4822 116 52175	100Ω 5% 0.5W
3604	4822 116 52175	100Ω 5% 0.5W
3605	4822 051 20472	4k7 5% 0.1W
3606	4822 116 52256	2k2 5% 0.5W
3607	4822 116 52256	2k2 5% 0.5W
3608	4822 116 52175	100Ω 5% 0.5W
3609	4822 050 11002	1k 1% 0.4W
3610	4822 116 52303	8k2 5% 0.5W
3611	4822 117 11373	100Ω 1%
3612	4822 116 52303	8k2 5% 0.5W
3614	4822 116 52283	4k7 5% 0.5W
3615	4822 050 21003	10k 1% 0.6W
3618	4822 050 21003	10k 1% 0.6W
3622	4822 117 11373	100Ω 1%
3623	4822 051 20472	4k7 5% 0.1W
3624	4822 116 52175	100Ω 5% 0.5W
3625	4822 116 52175	100Ω 5% 0.5W
3626	4822 051 20472	4k7 5% 0.1W
3627	4822 051 20472	4k7 5% 0.1W
3628	4822 117 10833	10k 1% 0.1W
3630	4822 117 11449	2k2 5% 0.1W
3632	4822 051 20008	jumper
3634	4822 116 52175	100Ω 5% 0.5W
3636	4822 117 11373	100Ω 1%
3681	4822 051 20391	390Ω 5% 0.1W
3682	4822 051 20332	3k3 5% 0.1W
3683	4822 051 20391	390Ω 5% 0.1W
3684	4822 051 20561	560Ω 5% 0.1W
3685	4822 051 20561	560Ω 5% 0.1W
3686	4822 117 11139	1k5 1% 0.1W
3691	4822 117 13577	330Ω 1% 1.25W
3692	4822 051 10102	1k 2% 0.25W
3693	4822 117 11503	220Ω 1% 0.1W
3801	4822 116 83872	220Ω 5% 0.5W
3802	4822 050 11002	1k 1% 0.4W
3803	4822 117 10837	100k 1% 0.1W
3804	4822 117 11149	82k 1% 0.1W
3805	4822 051 10102	1k 2% 0.25W
3806	4822 117 10837	100k 1% 0.1W
3807	4822 117 11149	82k 1% 0.1W
3808	4822 050 11002	1k 1% 0.4W
3809	4822 117 11927	75Ω 1% 0.1W
3831	4822 117 10834	47k 1% 0.1W
3832	4822 116 52175	100Ω 5% 0.5W
3833	4822 116 52175	100Ω 5% 0.5W
3836	4822 050 11002	1k 1% 0.4W
3837	4822 116 52175	100Ω 5% 0.5W
3838	4822 051 10102	1k 2% 0.25W
3839	4822 116 52175	100Ω 5% 0.5W
3840	4822 051 20472	4k7 5% 0.1W
3841	4822 051 20822	8k2 5% 0.1W
3842	4822 051 10102	1k 2% 0.25W
3849	4822 051 20471	470Ω 5% 0.1W
3901	4822 051 10102	1k 2% 0.25W
3902	4822 051 20332	3k3 5% 0.1W
3903	4822 051 20332	3k3 5% 0.1W
3903	4822 051 20822	8k2 5% 0.1W
3904	4822 117 10833	10k 1% 0.1W
3905	4822 051 20332	3k3 5% 0.1W
3906	4822 117 10833	10k 1% 0.1W
3907	4822 117 11507	6k8 1% 0.1W
3921	4822 051 20334	330k 5% 0.1W
3922	4822 051 20334	330k 5% 0.1W
3981	4822 116 83876	270Ω 5% 0.5W
3982	4822 116 83876	270Ω 5% 0.5W
4xxx	4822 051 10008	0Ω 5% 0.25W
4xxx	4822 051 20008	0Ω 5% 0.25W

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5001	4822 157 51216	5.6µH
5002	2422 535 94639	10U 20%
5003	4822 157 11866	1.8µH 10%
5201	4822 157 11868	2.7µH 5%
5202	4822 157 51462	10µH 10%
5241	4822 157 51462	10µH 10%
5242	4822 157 11706	10µH 5%
5406	4822 157 11539	LIN CORRECTOR COIL
5408	4822 157 71401	27µH
5410	4822 157 71401	27µH
5444	2422 531 02446	DRIVER SC10009-03
5445	4822 140 10669	LOT 1142.5093D
5501	2422 549 44725	MAINS 30mH DMF2430H22
5505	4822 526 10704	100mH
5520	2422 531 02456	S359B4-09
5520	2422 531 02457	SS28010-06
5521	4822 526 10704	100mH
5560	4822 526 10704	100mH
5561	4822 157 52392	27µH
5562	4822 157 11411	100mH
5562	4822 526 10704	100mH
5563	4822 526 10704	100mH
5602	4822 157 11867	5.6µH 5%
5603	4822 157 11867	5.6µH 5%
5604	4822 157 11867	5.6µH 5%
5831	4822 157 11139	6.8µH 5%
5832	4822 157 11139	6.8µH 5%
5833	4822 157 11139	6.8µH 5%
5835	3198 018 31290	12U 10%

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6001	4822 130 34142	BZX79-B33
6002	4822 130 11397	BAS316
6004	4822 130 10414	BA792
6201	4822 130 11397	BAS316
6202	4822 130 11397	BAS316
6206	4822 130 11416	PDZ6.8B
6241	4822 130 11416	PDZ6.8B
6402	4822 130 10871	SBYV27-200
6403	9340 559 50112	BY228/24
6404	4822 130 32896	BYD33M

6405	4822 130 42488	BYD33D
6406	5322 130 34331	BAV70
6407	4822 130 11397	BAS316
6408	4822 130 11397	BAS316
6409	4822 130 42488	BYD33D
6410	4822 130 42488	BYD33D
6411	4822 130 42488	BYD33D
6411	5322 130 81917	SB140
6412	4822 130 42488	BYD33D
6412	5322 130 81917	SB140
6413	4822 130 30621	1N4148
6414	4822 130 34167	BZX79-B6V2
6415	4822 130 11397	BAS316
6416	4822 130 11397	BAS316
6417	4822 130 11551	UDZS10B
6419	4822 130 34173	BZX79-B5V6
6420	4822 130 30862	BZX79-B9V1
6423	4822 130 42488	BYD33D
6471	4822 130 42488	BYD33D
6500	4822 130 31083	BYW55
6501	4822 130 31083	BYW55
6502	4822 130 31083	BYW55
6503	4822 130 31083	BYW55
6520	4822 130 42488	BYD33D
6523	4822 130 30621	1N4148
6540	4822 130 34167	BZX79-B6V2
6541	4822 130 61219	BZX79-B10
6560	9322 127 32682	BYW76-RAS15/10
6561	9322 127 32682	BYW76-RAS15/10
6563	4822 130 11397	BAS316
6564	9322 161 76682	SB340L-7024
6565	5322 130 34331	BAV70
6567	4822 130 11148	UDZ4.7B
6681	4822 130 31983	BAT85
6691	9322 172 20682	LED LTL-102SRHAP
6692	9322 174 42667	IR RECEIVER TOSP4136UH1
6831	4822 130 30621	1N4148
6901	4822 051 20008	JUMP

7001	4822 130 63732	MMUN2212
7101	4822 130 60511	BC847B
7200	9352 706 22557	TDA9552H/N1/3/0607
7201	4822 130 60511	BC847B
7204	4822 130 60373	BC856B
7206	5322 130 42755	BC847C
7209	5322 130 42718	BFS20
7210	5322 130 42718	BFS20
7241	3198 010 44010	PDTA114ET
7401	9340 547 00215	PDTC143ZT
7402	9340 563 21127	BUT11APX-1200
7403	4822 130 40981	BC337-25
7404	4822 130 41087	BC638
7405	4822 130 60373	BC856B
7406	4822 130 60373	BC856B
7407	4822 130 40823	BD139
7408	4822 130 40823	BD139
7409	4822 130 60373	BC856B
7435	4822 130 40823	BD139
7471	4822 209 13176	TDA9302H
7515	8238 274 02070	TCET1103G
7520	9352 673 56112	IC TEA1507P/N1
7521	9322 160 62687	STP6NC80ZFP
7521	9322 164 04687	STP4NC80ZFP
7522	4822 130 60511	BC847B
7540	4822 130 40959	BC547B
7560	4822 209 15576	LE33CZ
7560	4822 209 16978	LF33CV
7561	9340 547 00215	PDTC143ZT
7562	4822 130 60373	BC856B
7564	4822 130 60373	BC856B
7602	9322 147 25682	M24C16-WBN6
7801	5322 209 11102	HEF4052BT
7803	4822 130 60511	BC847B
7804	4822 130 60511	BC847B
7831	9322 160 79682	MSP3415G-PO-B8 FM
7832	4822 130 60511	BC847B
7833	4822 130 60511	BC847B
7834	4822 130 60511	BC847B
7835	4822 130 60511	BC847B
7901	9322 158 65667	AN7522N

CRT Panel [B]

Various

0156	3119 107 17411	WIRETREE MAIN-SPK STEREO
0244	2422 025 04851	CON 3P
0245	2422 025 04854	CON 6P Female
0254	2422 500 80076	SOC CRT 9P F N-NECK B
0254	2422 500 80077	SOC CRT V 9P F M-NECK B

2313	4822 122 33216	270pF 5% 50V
2313	4822 122 33575	220pF 5% 63V
2323	4822 122 33172	390pF 5% 50V
2331	4822 122 33172	390pF 5% 50V
2341	2020 558 90571	2N2 10% 1KV
2341	4822 126 14588	2.2nF 10% 1KV
2342	4822 121 70386	47nF 10% 250V
2343	4822 121 70386	47nF 10% 250V

3311	4822 051 20392	3k9 5% 0.1W
3312	4822 117 13577	330Ω 1% 1.25W
3313	4822 051 20109	10Ω 5% 0.1W
3314	4822 053 12183	18k 5% 3W
3316	4822 052 10689	68Ω 5% 0.33W
3317	3198 013 01520	1k5 2% 1/2W
3321	4822 051 20392	3k9 5% 0.1W
3322	4822 117 13577	330Ω 1% 1.25W
3323	4822 051 20109	10Ω 5% 0.1W
3324	4822 053 12183	18k 5% 3W
3326	4822 052 10689	68Ω 5% 0.33W
3327	3198 013 01520	1k5 2% 1/2W
3331	4822 051 20392	3k9 5% 0.1W
3332	4822 117 13577	330Ω 1% 1.25W
3333	4822 051 20109	10Ω 5% 0.1W
3334	4822 053 12183	18k 5% 3W
3336	4822 052 10689	68Ω 5% 0.33W
3337	3198 013 01520	1k5 2% 1/2W
3341	3198 013 01520	1k5 2% 1/2W
3347	4822 052 10221	220Ω 5% 0.33W
3348	3198 013 01520	1k5 2% 1/2W
3349	4822 052 10158	1Ω5 5% 0.33W
3349	4822 052 10188	1Ω8 5% 0.33W
3350	4822 052 10158	1Ω5 5% 0.33W
3350	4822 052 10188	1Ω8 5% 0.33W

5341	4822 157 11672	12µH 5%
5341	4822 157 50965	15µH
5342	4822 526 10704	100mH

6311	4822 130 30842	BAV21
6321	4822 130 30842	BAV21
6331	4822 130 30842	BAV21
6341	4822 130 30842	BAV21
6342	9337 587 20673	BA282
6343	4822 130 10837	UDZS8.2B
6344	4822 051 20008	JUMPER

7311	4822 130 41782	BF422
7312	4822 130 41782	BF422
7313	4822 130 41646	BF423
7321	4822 130 41782	BF422
7322	4822 130 41782	BF422
7323	4822 130 41646	BF423
7331	4822 130 41782	BF422
7332	4822 130 41782	BF422
7333	4822 130 41646	BF423

EPS 4 [F]

Various

1073	3139 137 22222	Ext. Power Supply Module

Clock Module [G]

Various

1076	3119 108 52471	Small digit disp 14" sets
1076	3119 108 52191	Small digit disp

UIR/LS/Vbat Module [H]

Various

C2	2238 586 59812	100N
C3	2238 586 59812	100N
C6	4822 126 14238	50V 2N2
C7	2238 586 59812	100N
C8	2238 586 59812	100N
D3	4822 130 10852	BZX284-C6V8
D4	4822 130 10852	BZX284-C6V8
D5	4822 130 10852	BZX284-C6V8
D9	4822 130 10852	BZX284-C6V8
F1	4822 071 54001	19372(400MA)
Q1	4822 130 60511	BC847B
Q2	4822 130 60373	BC856B
Q4	9310 125 00235	N-CHANNEL MOS BSN20
Q5	4822 130 60373	BC856B
Q6	4822 130 60511	BC847B
Q7	4822 130 60511	BC847B
Q9	4822 130 40959	BC547B
R2	4822 051 30103	10K 5% 0,062W
R3	4822 051 30103	10K 5% 0,062W
R4	4822 051 30103	10K 5% 0,062W
R5	4822 051 30272	2K7 5% 0,062W
R6	4822 051 30101	100R 5% 0,062W
R7	4822 051 30101	100R 5% 0,062W
R8	4822 051 30102	1K 5% 0,062W
R9	4822 051 30471	470R 5% 0,062W
U1	9965 000 11573	MOD JACK
U2	2422 026 05223	PHONE 1P Female 3.5 ST
U3	5322 209 14481	HEF4053BT
U4	4822 209 90008	L78M05CP
D11	4822 130 34441	BZX79-B22
D12	4822 130 34441	BZX79-B22
Q10	4822 130 41782	BF422
R10	4822 051 30103	10K 5% 0,062W
R11	4822 051 30103	10K 5% 0,062W
R12	4822 051 30103	10K 5% 0,062W
R13	4822 051 30103	10K 5% 0,062W
R15	4822 051 30102	1K 5% 0,062W
R17	4822 051 30103	10K 5% 0,062W
R18	4822 117 13632	100K 1% 0.62W
R19	4822 051 30101	100R 5% 0,062W
R20	4822 051 30479	47R 5% 0,062W
R21	4822 051 30102	1K 5% 0,062W
R22	4822 051 30103	10K 5% 0,062W
R23	4822 117 13632	100K 1% 0.62W
R25	4822 051 30008	JUMPER
R26	4822 051 30103	10K 5% 0,062W
R29	2322 257 41332	3.3K 5% 5W
R30	4822 116 52304	82K 5% 0,5W
R31	4822 116 52304	82K 5% 0,5W
R32	4822 051 30103	10K 5% 0,062W
R33	4822 051 30008	JUMPER
RT1	9965 000 11572	RXE030
0237	4822 267 10567	4P
0259	2422 025 16759	CON 5P Male
0262	2422 025 16936	CON 3P Male
1240	2422 025 06353	CON 5P Male
1246	2422 025 16601	CON 3P Male
1251	2422 025 15851	CON 4P Male

SP/LS Module [I]

Various

C1	4822 124 40207	100uF 20% 25V
C5	2238 586 59812	100N
C6	4822 126 14238	50V 2N2
D1	4822 130 34173	BZX79-B5V6
D2	4822 130 30621	1N4148
D3	4822 130 10852	BZX284-C6V8
D4	4822 130 10852	BZX284-C6V8
D5	4822 130 10852	BZX284-C6V8
D9	4822 130 10852	BZX284-C6V8
Q1	4822 130 60511	BC847B
Q6	4822 130 60511	BC847B
Q7	4822 130 60511	BC847B
Q8	4822 130 60511	BC847B
R1	4822 116 83876	270R 5% 0,5W
R2	4822 051 30103	10K 5% 0,062W
R3	4822 051 30103	10K 5% 0,062W
R4	4822 051 30103	10K 5% 0,062W
R5	4822 051 30101	100R 5% 0,062W
R6	4822 051 30101	100R 5% 0,062W
R7	4822 051 30101	100R 5% 0,062W
R9	4822 051 30101	100R 5% 0,062W
U1	9965 000 11573	JACK 95001-2661 HOR
U2	2422 026 05223	PHONE 1P F 3.5 ST

D10	4822 130 81637	PMLL4148L
D11	4822 130 34441	BZX79-B22
D12	4822 130 34441	BZX79-B22
R11	4822 051 30103	10K 5% 0,062W
R12	4822 051 30103	10K 5% 0,062W
R13	4822 051 30103	10K 5% 0,062W
R20	4822 051 30479	47R 5% 0,062W
R21	4822 051 30102	1K 5% 0,062W
R22	4822 051 30103	10K 5% 0,062W
R23	4822 117 13632	100K 1% 0.62W
R24	4822 117 13632	100K 1% 0.62W
RT1	9965 000 11572	RXE030
1246	2422 025 16382	CON 3P Male
1251	2422 020 00725	CON 3P Male
1259	4822 265 41391	B9B-EH-A

Interface Module [J]

Various

0217	2422 025 16385	CON 4P Male
0227	2422 025 15849	CON 6P Male
0228	2422 025 16386	CON 5P Male
0237	4822 267 10565	4P
0240	2422 025 11244	CON 7P Male
0242	4822 267 10557	B10B-EH-A
0251	4822 267 10565	4P
0259	2422 025 15848	CON 5P Male
1259	4822 265 41391	B9B-EH-A
1800	3135 010 03531	32PIN CON

2700	3198 017 41050	1µF 10V
2701	4822 126 14305	100nF 10% 16V
2702	3198 017 41050	1µF 10V
2703	4822 124 41584	100µF 20% 10V
2704	3198 017 41050	1µF 10V
2705	4822 122 33761	22pF 5% 50V
2709	4822 126 14305	100nF 10% 16V
2710	4822 126 14305	100nF 10% 16V
2711	4822 122 31765	100pF 2% 63V
2712	4822 122 31765	100pF 2% 63V
2713	4822 126 14305	100nF 10% 16V
2714	4822 126 14238	2N2 50V

3700	4822 051 30562	5k6 5% 0.063W
3701	4822 051 30223	22k 5% 0.062W
3702	4822 051 30223	22k 5% 0.062W
3703	4822 051 30759	75Ω 5% 0.062W
3704	4822 051 30472	4k7 5% 0.062W
3706	4822 051 30683	68k 5% 0.062W
3707	4822 051 30103	10k 5% 0.062W
3708	4822 117 12925	47k 1% 0.063W
3710	4822 117 12925	47k 1% 0.063W
3715	4822 051 30101	100Ω 5% 0.062W
3716	4822 051 30103	10k 5% 0.062W
3717	4822 051 30103	10k 5% 0.062W
3718	4822 051 30103	10k 5% 0.062W
3719	4822 051 30562	5k6 5% 0.063W
3720	4822 051 30103	10k 5% 0.062W
3721	4822 051 30472	4k7 5% 0.062W
3722	4822 051 30472	4k7 5% 0.062W
3729	4822 051 30103	10k 5% 0.062W
3731	4822 117 12968	820Ω 5% 0.62W
3733	4822 117 12925	47k 1% 0.063W
3734	4822 117 12925	47k 1% 0.063W
3736	4822 051 30759	75Ω 5% 0.062W
3737	4822 051 30124	120k 5% 0.062W
3738	4822 051 30682	6k8 5% 0.062W
3739	4822 053 11688	6Ω8 5% 2W
3740	4822 116 83872	220Ω 5% 0.5W
3741	4822 051 30102	1k 5% 0.062W
3743	4822 051 30101	100Ω 5% 0.062W
3744	4822 051 30101	100Ω 5% 0.062W
3745	4822 050 21003	10k 1% 0.6W
3746	4822 051 30103	10k 5% 0.062W
3748	4822 051 30103	10k 5% 0.062W
3749	4822 051 30103	10k 5% 0.062W
4xxx	4822 051 10008	0Ω 5% 0.25W
4xxx	4822 051 20008	0Ω 5% 0.25W

5705	4822 157 11149	56µH 5%

6701	4822 130 42488	BYD33D
6702	4822 130 83757	MCL4148
6703	4822 130 34233	BZX79-B5V1
6704	4822 130 11666	BZX284-C8V2
6706	4822 130 11666	BZX284-C8V2

7700	4822 130 60511	BC847B
7701	4822 130 60511	BC847B
7705	4822 130 60373	BC856B
7706	4822 130 60511	BC847B
7708	4822 130 60511	BC847B
7710	9322 119 29685	DS1813R-5
7711	4822 130 60511	BC847B
7712	4822 130 60511	BC847B
7715	4822 130 60511	BC847B
7716	4822 130 60511	BC847B
7717	5322 209 73179	74HCT74D
7718	4822 130 60511	BC847B